

Refuge Notebook

Volume 6 • 2004

This volume was compiled in 2016 by Jennifer Peura from the Kenai National Wildlife Refuge's archive of *Refuge Notebook* articles. Formatting has been improved, some hyperlinks (URI's) have been updated, and minor edits were made, but the articles have mostly been unchanged.

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Rota? It's a small world

by John Morton

What does Rota, a 30-square mile island in the tropical South Pacific, have to do with the Kenai Peninsula? Not much at first glance. Rota is in the Commonwealth of the Northern Mariana Islands, a U.S. protectorate much like the Virgin Islands or Puerto Rico. It's much closer to the Philippines than it is to any of the 50 states. About 3,000 people live on Rota, mostly Chamorros, the indigenous people who settled there a thousand years before Christ was born.

The Spanish colonized the Marianas in the late 17th century; as did the Russians begin colonizing the Aleutians and coastal Alaska 50 years later. When the Klondike gold rush was in full swing, the Spanish sold Rota to the Germans to pay for the Spanish-American War of 1898. About the time that Anchorage was founded during WWI, the Germans gave up Rota to the Japanese, who rapidly developed the island during the three decades prior to WWII.

By 1935 there were 6,000 residents on Rota, and the main village of Songsong had paved streets, electric lights, telephones, automobiles, and trolley cars! A vertical tram transported mined phosphate from the mountains down to the processing plant on the coast, and a train hauled sugarcane from the northern plateau to the southern port. At the same time back in Alaska, Anchorage had fewer than 4,000 residents, there may have been as many as two million caribou in the state, the Matanuska Valley was just being homesteaded, and the Kenai National Moose Range had yet to be established by Franklin Roosevelt. The rest of the U.S. was living in the Great Depression.

Towards the end of WWII, not long after the 11th Air Force dropped 27,000 pounds of ordinance on the Aleutian islands of Kiska and Attu in preparation for a U.S. invasion, Rota was overlooked in the hurry to get to Japan. Because Rota never endured the ferocious tank battles and destructive shelling that occurred on many other Pacific islands, it is one of the most beautiful islands in Micronesia today, with native limestone forest intact over much of the island.

Hard to believe that Rota has been a part of the U.S. for 60 years! I doubt that most of you have ever heard of it. And yet the same Endangered Species Act that protects Short-tailed Albatrosses, Spectacled Ei-

ders and the Aleutian Shield Fern in Alaska, is the same federal law that protects Mariana Crows on Rota. Mariana Crows exist only on Rota and Guam, another island in the Marianas, and nowhere else in the world. However, it no longer breeds on Guam because of predation by Brown Tree Snakes, a species that was accidentally introduced from the Admiralty Islands when Guam was used as a repository for salvaged military equipment after WWII. To make matters worse, the Rota population has declined 60% since 1982, to fewer than 400 crows when last surveyed in 1998.

I was part of that island-wide survey in 1998 as a U.S. Fish and Wildlife Service biologist. I had studied Mariana Crows on both Guam and Rota for the better part of six years. I returned to Rota for two weeks this past November to help re-survey Mariana Crows. Counting birds seems simple enough, but you have to realize that this is real tropical jungle. The kind of place that Tarzan would call home. Hot, humid jungle close to the equator with enveloping vines that can be so thick that you literally cut tunnels through them with a machete. And the island was formed by periodic tectonic activity that shoved coral reefs above the water in concentric circles, so the island rises like a tiered wedding cake 1,500 feet above the ocean. For those of you that have snorkeled or dove over coral reefs, you know how jagged they can be. Try walking on them.

Much of the pleasure for me was seeing crows that I had color banded as nestlings several years ago now producing young of their own. Mariana crows have phenomenal site tenacity, much like our own Bald Eagles on the Kenai Refuge. They defend the same territory year after year, occasionally nesting in the same tree where they lay one to four eggs. I and several other dedicated biologists followed 30 pairs six days a week for three years running. 'Dedicated' might be an understatement. 'Fanatical' comes to mind.

So why has the crow population on Rota declined? Introduced predators like Monitor Lizards and rats are reducing nest success, much like Norway rats have decimated bird populations in some of the Aleutian and Pribilof Islands. Aggression by Drongos, a Southeast Asian flycatching bird that the Japanese intro-

duced to eat agricultural insects, may be interfering with normal crow behavior, in much the same way that European starlings have affected some native birds in the lower 48. Global climate change appears to be increasing the frequency and magnitude of typhoons, much like Ed Berg has suggested that climate change has increased Spruce Bark Beetle activity and the drying of wetlands on the Kenai. Clearing forests for golf courses and agricultural homesteads has reduced crow habitat, much like urban and residential development on the Kenai has carved into brown bear habitat. In more recent years, Mariana Crows have been persecuted because some locals believe they hinder economic development. I can't think of a similar counterpart in Alaska, but certainly Spotted Owls in

northern California come to mind.

So Rota and the Kenai do share similar wildlife issues, although they involve unique species and different cultural perspectives. The moral of the story is that you can run, but you can't hide. Whether you live in America's last frontier in the Far North or on a tropical outpost in the middle of the Pacific Ocean, it is a very small and shrinking world. A good New Year's resolution might be to enjoy our natural world, as many of us already do, but don't forget to appreciate it.

John Morton is the Supervisory Fish & Wildlife Biologist at the Kenai National Wildlife Refuge. Previous Refuge Notebook columns can be viewed on the Web at <http://www.fws.gov/refuge/kenai/>.

Get out on the Refuge to beat those winter blues

by Doug Newbould

My dad has a lot of those sayings, you know the ones that make you smile, or grimace or laugh out loud. When I hear someone else speak one of his phrases, it's like I only hear his voice. It doesn't mean anything coming out of their mouths. One of his Ronisms, as my wife so fondly calls them, is "I need to get up there and reejoovinate my bawdy!" Another one of a similar nature is, "It's time to head up to God's Country!"

To really appreciate these Ronisms, you need a little more information. First, you need to have a mental picture of my dad. He's a big man, not big like me (6'2" and 220). No, he's a lot bigger—like 6'2" and 350. And it isn't all fat. He's a large-boned, Illinois sandy clay loam, corn-fed kind of Big. In Texas, he's a natural Bubba. In Alaska I'll bet there are some pretty big bruins that would head the other way when he gave them "the Newbould stare". You scoff, but until you've withered under that steely gaze, you have no idea. The first time my soon-to-be-wife ran into "the stare", well, it was the first time I ever saw her go speechless.

The second thing you need to know about my dad is the size of his heart. He has a great—big—heart. Not big like a Himalayan Sherpa's—made mighty by ex-

treme exertion. But the other kind of big, as in a large capacity for life and to love. Now that you think I've gone all sentimental on you and you've either swallowed the hook or darted under the cutbank, I'm going to share one other thing about my dad.

You see, he loves the outdoors, in all its forms—rugged or pastoral, majestic or cultivated, untrampled or manicured, sweating or shivering, working or playing—it doesn't matter. To my dad, it's where we all came from, and it's where we're all going. It's where we belong: outside. So if you are wondering why you are so tired and rundown and you can't sleep or you can't wake up. Duh!!! It's because you're cooped up like a pig in a hogbarn, eating and sleeping, sleeping and eating.

Come on, let's go. Hop on those skis, slap on those bear paws, pack up that survival kit. The Refuge is calling you. The doctor is out. Alaska awaits. It's time to head out to God's Country and get reejoovinated!

Doug Newbould is the Fire Management Officer at the Kenai National Wildlife Refuge. Previous Refuge Notebook columns can be viewed on the Web at <http://www.fws.gov/refuge/kenai/>.

Veggie variety; sometimes muskrats skip salad for something more meaty

by Ted Bailey

Did you ever see piles of shells of freshwater mussels, also called freshwater clams, along lake-shores while canoeing on the Kenai National Wildlife Refuge? The shells are often partially hidden under overhanging banks, under tree roots, or under low-hanging limbs of spruce trees growing at lake edges.

I wondered about these piles of opened shells when I first observed them on the Kenai Peninsula many years ago. I assumed that feeding mink or otters had left these shells behind, but I was puzzled about how many shells I was seeing for so few mink and otters.

One day while canoeing along the shore of a large lake in the Swanson River Canoe System, I watched a muskrat under an overhanging bank deftly open up the shell of a mussel and eat it.

I have always been fascinated by the behavior and ecology of muskrats. My parents lived on the edge of a small marsh and as a boy I spent hours watching muskrats and other marsh creatures. Like most muskrats, our muskrats fed entirely on aquatic vegetation, such as cattails, sedges and grasses growing next to the marsh. Muskrats throughout most of their vast range in North America are basically herbivores, eating vegetation.

At that time I didn't know that muskrats also could be meat eaters, or carnivores, until I observed the mussel-eating muskrat on the Kenai Refuge. Intrigued by this unusual muskrat behavior, I reviewed the published literature on their feeding habits and discovered that mussel-eating muskrats were reported as early as 1887 in the eastern United States. It is generally believed that muskrats can supplement their normal vegetarian diet with animal flesh in habitats where aquatic vegetation is sparse but animal food present (usually lakes rather than food-rich marshes) or in habitats where animal food is abundant. In addition to eating freshwater mussels, muskrats also have been known to eat fish, crayfish, insects, snails, frogs, turtles, young birds and sometimes other muskrats.

There have only been a few studies of muskrats feeding on freshwater mussels. In a small lake in the

boreal forest zone of Alberta, Canada, biologists reported that muskrats were selectively feeding on the larger and older mussels in the lake. The muskrat-preferred mussels were more than two inches long and seven years old, whereas the lake average was less than two inches long and six years of age.

Some of the piles of mussel shells, or middens, left by muskrats contained over a thousand shells. By collecting all the shells from all the middens at given intervals, the Alberta biologists estimated that the muskrats were eating a minimum of 228 mussels per day, although they could not determine how many muskrats were involved.

It is not known if muskrats feed year-round on mussels. In the Alberta study the consumption rate of mussels increased through the summer, but the biologists could not determine if the muskrats also fed on mussels during the winter.

In another lake study the muskrats switched to mussels in the late autumn after the vegetation died back. At the high northern latitudes, life under the ice during long and dark winters is perilous, especially for muskrats living in lakes where aquatic vegetation is sparse or absent. For obvious reasons, studies of the diets of muskrats living under the ice in such lakes are essentially nonexistent. The delayed freeze-up of lakes on the peninsula this fall, however, allowed me to observe what happens after the vegetation has died back, but before the lakes freeze up.

Several days prior to freeze-up of many peninsula lakes on Nov. 10, I watched two muskrats repeatedly dive far out in a lake where I knew there were some freshwater mussels. Their dives usually kept them underwater for 18-20 seconds and they were diving in water at least eight to 12 feet deep. I could not tell because of the distance whether they were opening and eating the mussels while floating on the surface after a dive, but periodically they swam to a secluded part of the lake where I had previously found piles of opened mussel shells.

Since swimming muskrats propel themselves only with their webbed back feet, they can carry mussels in

their forepaws while swimming to shore.

Although unknown, it is possible that after freeze-up and while swimming under the ice, muskrats bring mussels inside their burrows or other places hidden in the banks. Muskrats apparently are capable of staying under water up to 17 minutes before requiring air, but it is not known if they routinely stay submerged this long while swimming under the winter ice.

If they can find air pockets beneath the ice, muskrats can utilize this trapped air space to breathe. They also make and carefully arrange small protective shelters on top the ice called “pushups” in which to safely feed.

Muskrats open a mussel by inserting their lower incisors between the leading edges of the two valves of

the shell and prying upward to break the upper valve to get at the soft body of the mussel. They then discard the shells in discrete piles.

You may notice these mussel middens on your next summer trip into the refuge canoe system. And if you are quiet and fortunate you may even catch a glimpse of the peninsula’s secretive, opportunistic and adaptable muskrat eating a mussel.

Ted Bailey is a retired Kenai National Wildlife Refuge wildlife biologist who has lived on the Kenai Peninsula for over 27 years. He is an adjunct instructor at the Kenai Peninsula College and maintains a keen interest in the Kenai Peninsula’s wildlife and natural history. Previous Refuge Notebook columns can be viewed on the Web at <http://www.fws.gov/refuge/kenai/>.

The Subnivean—the world beneath the snow

by Candace Ward

Beneath the thick snow exists an active, unseen world to our human eyes. Called the subnivean meaning “under the snow,” this area exists as an air space above the ground’s surface and below the snow pack.

Warmth from the ground melts the insulating snow above it. As water vapor freezes on the under-surface, small tunnels usually no more than 2 inches high are formed. The temperature in these snow tunnels remains above freezing even when outside temperatures drop to subzero digits.

The subnivean world is a cozy, winter home for mouse-like voles. Grass, leaves, roots, mosses, lichens, fungi, and seeds are all abundant beneath the snow. Voles gather these foods and store them in chambers carved out of snow. They also construct separate sleeping compartments with grassy nest-like beds.

Tiny shrews, small insectivorous mammals somewhat smaller than voles, create subnivean snow tunnels too. Naturalist Dr. E. W. Wilson once traced a subnivean shrew tunnel that was over a mile long on the Yukon River.

Shrews have one of the highest metabolisms of all mammals with heart rates of up to 1200 beats per minute. These small creatures hunt for mites, centipedes, spiders, and beetles in the unfrozen ground beneath the snow. Shrews must daily consume the equivalent (depending on the species) of one to three times their body weight. If they don’t find enough insects and other invertebrate prey, they will kill and eat voles or other shrews to satisfy their high energy needs.

Have you ever noticed in spring after the snow melts away the numerous small trails that traverse your lawn? These trails created by voles and shrews are the first areas to green up in our lawns having been aerated and fertilized by their passage.

The small predatory ermine enters subnivean tunnels created by voles and shrews and once inside hunts them. A host of larger predators like martens, foxes, coyotes and owls depend on voles, shrews, and an occasional ermine for winter food. These hunters use keen hearing and smell to locate their small prey and pounce through the snow to capture it.

Resident birds also use subnivean spaces for pro-

tection against cold. Redpolls and chickadees congregate in pairs and groups beneath the snow maintaining precious body heat. Larger birds including ptarmigan and grouse will submerge their bodies in snow to insulate themselves while resting. They often keep their heads above the snow to watch and listen for predators like hawks and owls.

One of the most remarkable subnivean creatures in Alaska is the 4.5 ft., 200 pound ringed seal of the Arctic Ocean. Ringed seals build subnivean lairs in snowdrifts to insulate themselves from extreme cold. As snowdrifts form in winter, ringed seals hollow out lairs in the snow adjacent to their breathing holes. Air temperatures in these chambers range between 20 and 40°F. while outside temperatures may be as frigid as – 60°F.

There may be several dens in a single drift. Pregnant females construct the most elaborate lairs with multiple chambers. In April, they give birth to their pups and nurse them inside these hideaways. Young pups mimic their mothers by digging snow tunnels expanding their elaborate subnivean world.

Polar bears use their excellent sense of smell to sniff out pups in snow chambers. They dig furiously for seal pups hoping to catch them before they can escape through snow tunnels to the ocean under the ice. Arctic foxes follow polar bears feeding on whatever scraps the bear leaves behind. Occasionally, in soft snow conditions, arctic foxes have successfully invaded dens and taken pups on their own.

Humans may have been originally inspired to build igloos and snow shelters by observing the lifestyles of our subnivean animal kindred. Next time you are out in the snow, take time to observe subtle subnivean activity. Look for small holes in the snow, tiny tracks, and raised snow tunnels. Who knows what you may learn from the subnivean that could help you in a winter survival situation?

Candace Ward works as a park ranger at Kenai National Wildlife Refuge in the Visitor Services Program. She enjoys winter snowshoe outings observing animal tracks and unraveling their stories in snow. Previous Refuge Notebook columns can be viewed on the Web at <http://www.fws.gov/refuge/kenai/>.

Birding hotline established for the central Kenai Peninsula

by Todd Eskelin

Bird watchers on the Kenai Peninsula will be happy to learn the Kenai National Wildlife Refuge is sponsoring a birding hotline for the central peninsula area. The number for the hotline is (907) 262-2300. For people who are not avid birders, some of the focus and excitement of spotting a new bird may seem down right bizarre. For the rest of us it is exciting to now have another tool available to help us find new birds in our area.

Here is how a birding hotline works: When you call the hotline, there will be a message notifying callers of any recent rare or unusual bird sightings. For more unique species, there will be directions to the last known location and the hotline will be updated daily. During slow periods, when there are not a lot of new birds around, the hotline might be updated every week. Regardless of the season, the success of the birding hotline is dependent on birdwatchers reporting their sightings. At the end of the message you will be prompted to leave your bird sighting, date, time, location, and a phone number.

Some readers may think the hotline is only for elite birders, but this really isn't the case. From my experiences with birding hotlines, novice birders initiate the majority of the best sightings. Often the reports describe a bird that just doesn't fit any of the pictures in the bird book. From these reports, more experienced birders are able to track down the bird and help the beginners with the identification. Sometimes this produces an outstanding rare bird sighting.

A perfect example of this was the occurrence of a rare woodpecker in the Talkeetna area in 2002. Myrtle and Steve Heinrich saw a pair of woodpeckers at their feeder and initially thought they were Hairy Woodpeckers. The male appeared to be injured as it had a bright red patch on the underside. After watching the pair, they realized the red patch was not an injury and called the birding hotline to report this strange woodpecker that did not appear in any of their bird guides. Experts from Anchorage visited their house and confirmed the bird was a Great Spotted Woodpecker, which is a resident of Russia as far east as the Kamchatka Peninsula. Previously, there had only been eight other sightings of this species in North America and they were all in the far western Aleutians and St.

George Island.

When Myrtle placed that call, she had no idea that this would trigger a nationwide response with people flying up from at least 15 different states to catch a glimpse of the rare woodpeckers. Obviously, this is not the normal response one would expect from every unknown bird that is reported to the hotline, but it brings home a key point regarding the possible economic gain of bird watching to communities in our great state.

A network of serious birders exists, connected to the Internet, with a handful of frequent flier tickets in their pockets. While there are a lot of people who just come to the Kenai for fishing, many would also like to get out and see some new birds while they are in the area.

Bird watching is the second fastest growing hobby in North America. A 1991 national study estimated that 27.7 million people participated in some level of bird watching and spent \$14.4 billion while doing so. It is also interesting to note that 36% of Alaskan residents participate in some level of bird watching. This ranks Alaska #4 in the nation for percentage of resident bird watchers.

I consider bird watching one of Alaska's great untapped renewable resources. The possible economic benefits to the community from people visiting our area are staggering. We just need to get the word out that we have great birding opportunities here on the Kenai.

So, this spring when you are out watching birds and you spot an unusual or rare bird that you think someone else may want to see, make sure you report your sighting to the Kenai National Wildlife Refuge Birding Hotline (907) 262-2300. If you are taking the relatives down to the Kenai Flats to watch the spring waterfowl migration, call the hotline and see if any unusual birds have been spotted. Your participation will make our new birding hotline an effective tool for birding enthusiasts on the Kenai.

Todd Eskelin is a Biological Technician at the Kenai National Wildlife Refuge. He specializes in birds and has conducted research on songbirds in many areas of the state. Previous Refuge Notebook columns can be viewed on the Web at <http://www.fws.gov/refuge/kenai/>.

Kenai Adopt-A-Stream program

by Dan Pascucci

They're out there.

On any given afternoon, down by local creeks, you might see them. Sometimes they're in the water, other times, they gather around the banks. You can occasionally hear their singing, and if you get close enough, you will surely hear their chatter.

Despite the fact that the Kenai Peninsula is home to many groups of these amazing creatures, most people aren't even aware of their existence. So today's Refuge Notebook will introduce you to some very important characters on the peninsula... Stream Keepers.

Stream Keepers are highly dedicated fifth and sixth graders from local elementary schools that have made a commitment to monitoring the health of local creeks and streams through the U.S. Fish and Wildlife Service's Adopt-A-Stream program.

The Adopt-A-Stream program has been connecting students to the local watershed since 1992, when a partnership between the Kenai Fish and Wildlife Field Office and Kalifornsky Beach Elementary School was formed. Since then, the program has expanded to include Tustumena Elementary, and the Soldotna Montessori School.

Stream Keepers at these schools monitor the health of Slikok Creek (K-Beach), Crooked Creek (Tustumena), and Soldotna Creek (SMS), on a monthly basis. With the assistance and technical guidance of Fish and Wildlife Service personnel, classes measure stream discharge, air and water temperatures, pH, conductivity, turbidity, and dissolved oxygen levels.

Students also collect, identify, record, and release fish and aquatic insects.

Along with exciting field trips, classrooms participating in the Adopt-A-Stream program are visited once a month by office staff for an in-class lesson on topics including fish, insects, cold weather safety, and water quality.

But don't be mistaken... despite all of the hard work involved in adopting a stream, these students are still having fun. Whether they're singing "insect Christmas carols" or practicing dance moves in the water, a visit to the stream or a lesson in the classroom is always a good time.

Adopt-A-Stream offers an opportunity for local schoolchildren to not simply learn about, but to experience the importance of healthy streams. Through their experiences at local streams, students reach a new understanding of their local watershed, and from that understanding comes a new appreciation for the resource.

So maybe the next time you're down by your favorite local creek some afternoon, you'll get a glimpse of some of these incredible creatures at work, getting their feet wet and immersing themselves in the study of the many natural wonders that surround us on the Kenai Peninsula. They're out there... and we sure are happy to know that they are.

Dan is an SCA volunteer intern at the Kenai Fish and Wildlife Field Office of the US Fish and Wildlife Service in Soldotna. Previous Refuge Notebook columns can be viewed on the Web at <http://www.fws.gov/refuge/kenai/>.

Plant fossils tell of a warmer Kenai 10 to 20 million years ago

by Ed Berg

My geology students and I have long enjoyed collecting plant fossils from the eroding bluffs along Kachemak Bay and Cook Inlet. Alder leaves are the most common fossils, but we also find birch and willow leaves. The shale bedrock can often be split along the layers to open up like a book, revealing a fully preserved leaf print to delight the eye. In the more sandy layers we find fragments of wood that were deposited in stream channels. Petrified and coal-ified logs and stumps can be found, often markedly flattened by the weight of overlying sediments through geologic time.

These plant fossils tell an interesting story of climate change, generally recording a multi-million year slide toward the ice ages that climaxed 16-18,000 years ago. The oldest plant fossils on the Kenai are found on the south side of Kachemak Bay, around Seldovia Point. In geologic vernacular the bedrock is called the Tyonek Formation of the Tertiary Period, and it dates to the early and middle Miocene epoch about 20 million years ago. Jack Wolfe of the U.S. Geological Survey described many species of leaves in cliffs east of Seldovia, such as oaks, maples, hickories and conifers, and said that they represent a Mixed Northern Hardwoods type of forest such as we see today in northern Wisconsin and Minnesota.

When we come over to the Homer side of Kachemak Bay, the rocks are younger—about 10 million years—and Wolfe argued that climate had gotten colder. Most of the big hardwood trees have dropped off the list of leaf fossils; alder, birch and willow are the common leaf fossils. Homer bedrock is the Tertiary-age Beluga Formation (late Miocene epoch). As we move north toward Ninilchik the rocks become still younger—and colder—in the Sterling Formation (Pliocene epoch) with an age range of 1.6 to 5 million years.

One of the most interesting leaf fossils found in both the Seldovia and Homer rocks is the Dawn Redwood (*Metasequoia*). This was a huge tree, quite like its cousin the Giant Sequoia in California. *Metasequoia* is a conifer and its leaf fossils look like flat stubby fir needles about a half inch long. It was first described

as a fossil (i.e., extinct) species by a Japanese paleobotanist in 1941, then three years later it was discovered growing as a single tree in a remote valley in Szechuan province in central China. The local people had built a temple at the base of the tree, and an old photograph shows that the tree was fully four times as tall as the temple. In 1948 the American paleobotanist Ralph Cheney led an expedition to China and discovered a valley with a thousand *Metasequoias*. Seeds were collected from this forest, and *Metasequoia* has subsequently been widely planted in botanical gardens around the world.

I recently had the opportunity to see *Metasequoias* in the botanical gardens in Dublin and Brussels, and they are indeed splendid trees, growing rapidly and soon to be towering over their neighbors. I also had an opportunity to see another of the long-vanished Seldovia Point hardwoods, called *Zelkova*, a large handsome tree in the Elm family.

The most interesting trees in these beautiful gardens, however, were the Podocarps. Herein lies a curious tale about the late Tertiary climate of the Cook Inlet basin, because quite recently a geologist has discovered Podocarp pollen in the coal layers in the Homer bluffs of Kachemak Bay.

Podocarps today are widespread tropical and temperate forest trees in the Southern Hemisphere, found abundantly in New Zealand, southeast Asia, central and south America (especially Chile and Argentina), and northeast Africa. The Podocarp family has about 200 living species, some of which are commercially important trees for timber and furniture. Podocarps are evergreen conifer trees, but the “needles” in some species can be a half-inch to an inch wide. The tree that I saw in Dublin, however, had normal needles a half-inch long and a sixteenth-inch wide, and was native to southern Chile. Podocarp seeds are usually enclosed in a fleshy berry-like fruit (an aril) rather than lying openly on scales like a pine or spruce cone. Birds eat the fruit and disperse the hard seeds.

My good friend geologist Linda Reinink-Smith has been making a detailed re-evaluation of the pollen in

the Tertiary-age coal seams in Kachemak Bay, and much to her surprise, she found fossil pollen grains of Podocarps, along with the expected pollen of alder, birch, willow, and Metasequoia that are well represented by leaf fossils. The earlier pollen studies, which examined much smaller samples, had missed the Podocarps and a number of other species.

Pollen usually preserves much better than leaves or wood in sedimentary rocks, because pollen is almost indestructible chemically. Pine and spruce pollen, for example, is abundant in our Tertiary rocks along the coast, but no pine or spruce needles have ever been reported in these rocks. (Fossil hunters take note: the needles that look like spruce in these rocks are Metasequoia, not spruce.)

In the Homer rocks Linda is also finding pollen (but not leaves) of many of the Northern Hardwoods species, whose leaves can be found in the much older Seldovia Point rocks, i.e., the oaks, maples, hickories, etc.

So, when interpreting past climates from plant fossils, the macrofossils (leaves and wood) can tell a quite different story from the microfossils (pollen and spores). A careful investigator should look at both stories. In our case, the presence of Podocarp pollen, and the Northern Hardwood pollen, suggests a warmer climate 10 million years ago than indicated by leaves of alder, birch and willow, which are indicative of our modern Alaska climate.

Just how much warmer might this 10-million year old climate be than our present climate? Granted that Kachemak Bay is often called the “Banana Belt” of Alaska; could we have been growing bananas on the Kenai 10 million years ago? Although Podocarps are probably the warmest of the warmer plants in the Homer pollen flora, modern Podocarps grow in a fairly wide range of Southern Hemisphere habitats. On the South Island of New Zealand, for example, they grow in warm lowland forests that get 5-10 meters of rain, which make Ketchikan look dry at 3.8 meters of annual rain. On the other extreme, the Podocarp alpine shrub (Mountain Totara) grows in the New Zealand mountains to 1500 meters under much drier and cooler conditions.

Pollen can usually be identified accurately to the genus, but it may be impossible to distinguish it at the species level. Linda Reinink-Smith was, for example, able to distinguish two Podocarp genera (Podocarpus and Dacrydium), but could not confidently pin these down to individual species. If the Kachemak

Bay Podocarp pollen could be identified to the species, which is rather unlikely, we might be able to say quantitatively how much warmer was the southern Kenai in Podocarp days.

Lacking identification to the species, however, we can look at the whole assemblage of plants—Podocarps, Metasequoia, oaks, maples, hickories, alder, birch and willow—and ask what temperature range could support all of these different types? Indeed, Linda has identified more than 70 plant genera in the pollen record of the Homer rocks, so the temperature ranges of all these genera considered together should provide a pretty good measure of the climate.

Let me say that we are not talking about huge differences in temperature. Jack Wolfe studied the climatology of hundreds of forests in North America and eastern Asia, and concluded that the Seldovia Point flora of 20 million years ago indicated a mean annual temperature of 43-45°F.

In Wolfe’s forest climate classification, if the mean annual temperature went as high as 50°F, the flora would shift into one of two types of forest, each with many more genera and species than appear on Linda Reinink-Smith’s revised list. If Wolfe is right about this temperature threshold, it would set a 50°F ceiling on any revised estimate of mean annual temperature for the southern Kenai during the interval of 10 to 20 million years ago, despite the discovery of warm-temperate to tropical plants like Podocarps.

The modern annual temperatures on the Kenai are 34-38°F. Some global climate change models forecast a 7-9°F increase in southern Alaska temperature in the next 75 years, which would increase our annual temperatures to 41-47°F. This should put us somewhere between present Juneau and Ketchikan temperatures, and definitely within the range the Podocarps that were growing here 10 million years ago.

Linda Reinink-Smith has applied for funding to continue her studies of the pollen and climate history of the Tertiary-age rocks on the Kenai, especially at Seldovia Point and the head of Kachemak Bay. In 2002 her fieldwork in Swift Creek canyon was interrupted when a stalking bear backed her out onto a promontory with no escape and then charged her. Linda fired once with her .44 magnum at a distance of 15 feet; the bear disappeared over the lip of the canyon, and Linda decided this particular bit of fieldwork could be postponed for a future field season.

Ed Berg has been the ecologist at the Kenai National Wildlife Refuge since 1993. Ed will be teach-

ing his 1-credit “Cycles of Nature” course starting the last week of March at the Soldotna and Kachemak Bay campuses of the Kenai Peninsula College. The syllabus is posted at [*http://chinook.kpc.alaska.edu/~ifeeb/cycles/*](http://chinook.kpc.alaska.edu/~ifeeb/cycles/)

[*cycles_index.html*](#). Previous Refuge Notebook columns can be viewed on the Web at [*http://www.fws.gov/refuge/kenai/*](http://www.fws.gov/refuge/kenai/).

Commentaries of a Game Warden

by Chris Johnson

I have worked on the Kenai National Wildlife Refuge for the past 14 years as a law enforcement officer. My actual title is Refuge Officer but I prefer to call myself a “Game Warden.” Over the years I have gathered all sorts of tales from my adventures, and have heard all kinds of excuses and reasons from people about why they had to do it. I will share a few of my stories with you. As I sit down to write this article I have to laugh and shake my head as I recall some of these incidents, and this in turn reminds me of other incidents. I will try to keep this article to just a few stories and if readers enjoy the topic, I am sure that I can find a few more to tell in a future article.

Part of my patrol area is Hidden Lake. Hidden Lake is a popular camping location in the spring and summer for families but in the winter I would say Hidden Lake is the most popular location for ice fishermen, after Lake Trout on the Peninsula. There was a core group of ice fishermen that was there almost every day. I don’t know if they were just getting bored or wanted to spice up their ice fishing experience. I realized this group was fishing with live bait, which is illegal. This became a game of cat and mouse. I would try and sneak up on them to catch them with their live bait on their lines. They would post “look outs” with spotting scopes to keep an eye out for the game warden. If a game warden was spotted, they would send a “chase vehicle” out to warn the fishermen. With receiving that information the fisherman would quickly cut their lines. When the game warden would finally reach their location, he would discover only “dangling” lines in empty holes. This game became a challenge for me. I would devise different strategies to approach the lake undetected. Eventually, I did catch these anglers with live bait several times, but I’ll admit that on not a few occasions I found only dangling lines in an empty hole.

It was late fall on the Kenai River just below Skilak Lake. It was spitting snow and about 20 degrees. I was hiding in the bushes and I observed a man land a large Rainbow trout. I watched him kill the fish and put it in his boat. I decided to contact the man at Lower Skilak boat ramp. The season for Rainbows was open and the only requirement was that if you retained a rain-

bow over 20 inches, it had to be recorded on the back of your fishing license. Well, I contacted the man at the boat ramp and he told me he had not caught any fish. I searched his boat high and low because I knew he had kept the fish. While I was searching the boat, the man was squirming around a lot. I thought he was really nervous about something or else real cold. Well, after about 15 minutes the guy couldn’t handle it anymore and told me the fish I was looking for was down his pants. The man opened up his pants and pulled a 24-inch Rainbow trout out of his pant leg. He had failed to record the fish on his license and was afraid that I was going to take the fish from him. I lent him a pen.

In this next story the moose gets its revenge and shoots back. I responded to a call about a sub-legal moose found dead off of Marathon Road. I hiked into the kill area with a State Protection Officer and the reporting parties. The Protection Officer and I proceeded to start quartering and skinning the moose in the hopes of recovering a bullet. As we finished with each quarter of the moose, we moved it out of our way. We finished skinning and examining a hindquarter with the hoof attached and moved it over to our pile of already examined meat. About three feet from that location, one of the reporting parties had set his rifle down against a tree stump. We set the examined quarter down and then started working on another quarter. About two minutes later a shot rang out and tree bark splattered all around us. One of the reporting parties dropped to the ground like he had been shot. My first thought was that one of the men with us had shot. My next thought was that we were under fire from somebody claiming the moose. After several minutes we were able to sort out that the rifle leaning against the tree stump had gone off, after the hoof of the moose quarter we had just moved fell and hit the safety and the trigger. The man that dropped like he had been shot actually had been hit by tree bark and was OK. After that we got down on our knees and prayed and thanked God that no one had been hurt.

I was working in the Kenai Russian River Ferry area, and I was in uniform standing right behind this guy that had a snagged fish on his line. The man

landed the fish and then clubbed it. He took the hook out of its tail and put the hook in its mouth. He then unhooked the fish and turned around to put the fish in his backpack. Well, when he turned around and saw me standing there in uniform, his eyes got as big as saucers and that fish went about twenty feet in the air and came right back down on top of the surprised snagger.

To combat the illegal and dangerous practice of hunters shooting from their vehicle or on or across a road, we use a decoy's set up just off the road. We have had a number of close calls from people shooting at animals from on or across the road. On one occasion a hunter was shooting at a spruce grouse that was on the road near the peak of a small hill. The hunter missed his shot and hit the mirror of a vehicle coming up the hill. On another occasion there was a father and son parked in their camper along the side of the road sleeping. Somebody took a few shots at a couple grouse in the road approximately 100 yards down the road. Two shots entered the camper just inches away from the father and son sleeping in the camper. There also have been several occasions when hunters have shot their own vehicle when trying to shoot at game from their vehicle.

When a hunter comes along and shoots at our decoys, we pop out of the trees and have a little meeting with the hunter and we discuss the merits of shooting from their vehicle or from on or across the road. One afternoon I set my decoy up on Swanson River Road; along comes a car and out pops a guy with a .22 rifle. He stands right in the center of the road and opens fire on the decoy. I come out of the trees yelling, "Game Warden, put your gun down!" The guy does not hear me. He's got tunnel vision and audio exclusion, an

effect to the human body when it's under stress commonly called the "fight or flight" syndrome. Any way he keeps shooting at this bird like it was coming to eat him. He fires 14 rounds and then starts to reload before I can get him convinced that the bird was not going to get him.

Wayward hunters aren't the only ones fooled by a grouse decoy. I have, for example, had my decoy stolen by a hungry coyote. The coyote looked at me, looked at my grouse decoy then back at me, then figured he could beat me to the bird and grabbed the decoy. I tracked him for about a quarter mile where he must of stopped to take a bite out of his stolen meal and left the decoy.

I have also had the decoy attacked by a hawk. The hawk just flew down and knocked over the decoy. Another time a raven flew down and started picking at the decoy until I shoed it away.

It has been fun reminiscing about old times. Retelling these stories has jogged my memory of other incidents. Other officers have reminded me of other stories and similar situations, in which they have been involved. Until next time, remember to bring some kids hunting or fishing. Share the experience, and show them the right way to do things. They are our future.

Chris Johnson is Supervisory Law Enforcement Officer at the Kenai National Wildlife Refuge. He is also a Police Defensive Tactics Instructor and a Firearms Instructor for the US Fish & Wildlife Service. He lives with his wife Pam and three children Chelsye, Tyler and Torrey in Sterling. Previous Refuge Notebook columns can be viewed on the Web at <http://www.fws.gov/refuge/kenai/>.

Unexpected encounters: aggressive grouse defends territory

by Ted Bailey

One never knows what to expect in nature; a sudden encounter with the unexpected is one of the reasons I enjoy walking in natural environments. As one of my daughters used to say long ago when she was a child, “You never know what you’re going to see.” She would say this when I sometimes took my family with me into the field while studying leopards in Africa. She was then repeating in her own way my own mantra to them, which was an attempt to keep our children captivated by the unique African animals we often observed.

My walks on the Kenai Peninsula seldom result in close encounters with nature’s creatures; most, if any, encounters are long distance experiences. However a recent exception to this rule occurred when my wife and I were walking through a wooded area on January 29. After steadily walking along we paused to talk and take in the beautiful snow-covered scenery. While talking to her I noticed out of the corner of my eye that a rather large bird had just landed on the snow about twenty feet behind her. At first it was partially hidden. I told her a bird had landed behind her, and I thought it was a bold gray jay. But soon after, from behind a small spruce tree walked a daring spruce grouse directly toward us. In a few minutes it was only ten feet from us, and I knew then it was a male by its flaring bright red “eyebrows.” It was obviously intent on encountering us. Since my wife was wearing a bright red parka I told her she had probably attracted a territorial male grouse intent on defending his territory. Soon the bird was at her feet, jumping up several times to buffet his wings against her legs, scratching her clothing with his feet and pecking at her with his beak.

Needless to say, my wife did not share my utter fascination with this sudden encounter. So we switched coats and the grouse quickly switched his attention to me instead of her. He “attacked” me several additional times and twice I reached down, grabbed him in my hands and tossed him into the air. He immediately went into a “hover” at a height of about eight feet and quickly landed again at my feet. All the while he was periodically vocalizing with guttural “chirring”

sounds and spreading and flicking his tail. After about twenty minutes we walked away. He followed us by walking behind us on the ground until we reached a small gully. There he stopped, apparently convinced he had “removed” us from his territory.

I was certain that my wife’s red parka had triggered a “territorial defense,” an instinctive behavioral response in grouse because we had both witnessed a similar response over ten years earlier when another male grouse in a different area similarly “attacked” me when I was wearing a bright orange wool cap. But that occurred later in either March or April and this was only January. I returned with a camera the next several days but no grouse appeared, and I considered our experience another “one time encounter.”

However, my “attractive-red-clothing-hypothesis” for initiating the grouse’s territory defensive behavior was shattered on February 8 when my son and I were again walking through the same area. Neither of us was wearing any visible red clothing. The grouse suddenly appeared again, vocalizing and displaying as it proceeded to “attack” us, buffeting its wings against our legs as in the previous encounter. Again I picked up the bird in my hands, tossed him into the air and he immediately landed at our feet. To condense an ongoing saga, the grouse responded to our presence in a similar fashion on February 9, 11, 12, 16, 18 and 20.

The boundary of his territory was distinct; he would not venture out of it nor concern himself with us beyond this invisible boundary. Most “attacks” were initiated in the center of his territory when we or I paused there for several minutes. A person continuously walking through the area without stopping probably would not even be aware that a grouse was nearby. To confront us, or me if I was walking alone, he either walked on the snow out of a dense stand of spruce trees or less often flew down from taller mature spruce trees nearby. I paced the length, perhaps the diameter of his territory, and it was at least eight hundred feet. On my February 20 encounter he escorted me out of his territory by walking its entire length.

What is one to make of such behavior? It is

primarily an instinctive behavioral response, which means the grouse is merely reacting to a stimulus, in this situation our presence, with or without red clothing, in his territory. Instinctive behavioral responses are “hard wired” into an animal’s brain circuits like circuits in your computer; once they are initiated they usually cannot be stopped and run their course. Our impulse to run when suddenly encountering a bear is a similar instinctive response that we are told by bear experts to “override” in our brains by our hopefully learned behavior.

In *The Birds of North America: Spruce Grouse*, grouse experts David Boag and Michael Schroeder discuss behaviors and sounds made by territorial male spruce grouse. One is a pecking sound made by the male’s beak when it pecks aggressively at the ground or inanimate objects; the grouse I observed repeatedly pecked at the snow while it displayed in front of me. Another display I observed was the tail-flick display produced by a rapid simultaneous lateral displacement of all the rectrices in an exaggerated fanning of the tail. This was accompanied by vocal “chirring” sounds.

Another observation the authors mention is that rather than flying, spruce grouse prefer to walk when moving from place to place, a fact exemplified by the male I observed that walked over eight hundred feet to

escort me from his territory. When an intruder starts to flee, which I sometimes did to elicit this response, a male will run toward the intruder with its plumage slicked down. Others have gotten male spruce grouse to attack their own image in a mirror with their feet, bill and wings focusing on the neck, head and back of the “intruder.”

Territories are most aggressively defended during the breeding season, but apparently they may be defended year round. Territorial behavior is related to the level of circulating hormones (androgens) in males, and not all males, especially yearling males are territorial. This particular grouse apparently has a high level of circulating androgens. His territorial behavior has fascinated me for nearly a month and has enriched my experience walking in the winter, exemplifying what my daughter once said: “You never know what you’re going to see”.

Ted Bailey is a retired Kenai National Wildlife Refuge wildlife biologist who has lived on the Kenai Peninsula for over 27 years. He is an adjunct instructor at the Kenai Peninsula College and maintains a keen interest in the Kenai Peninsula’s wildlife and natural. Previous Refuge Notebook columns can be viewed on the Web at <http://www.fws.gov/refuge/kenai/>.

When it comes to wildland fire management, Alaskans do things differently

by Doug Newbould

I moved to Alaska from Colorado in 1991, and it wasn't long before I realized—Alaskans do things differently than folks in other parts of the country. But if there is a conscious effort by Alaskans to be different, I'm not aware of it. Perhaps it's the Last Frontier, the Greatland, exerting her profound influence upon our collective subconscious. Perhaps Alaska makes its inhabitants feel privileged and proud, as if we are somehow uniquely qualified to live here. I know when I travel to other parts of the country, I feel somewhat superior—even though I know I have no right to feel that way. If Americans are perceived as arrogant, then I wonder how foreigners view Alaskans? How's that for a humbling thought?

In my twenty-five years as a wildland firefighter, I learned that suppression strategies and tactics vary for different fuel types and topography, for different weather conditions and fire behavior, and for the different challenges presented by urban and wild landscapes. As a fire management officer, I have experienced some of the regional and agency differences in fire management practices around the country.

In Alaska, wildland fire management is unique—in many ways. The first, and most obvious difference is scale. Alaska is so huge, and yet the firefighting community is relatively small. In the Lower 48, aviation resources are plentiful and play an important role in fire suppression, especially in the West. In Alaska, fire aviation resources are limited, but critical to our success. In the Lower 48, you can drive to most wildland fires, so engines play a major role. In Alaska, there are so few roads that engines play a limited role.

Due to the expanse of Alaska, the lack of infrastructure and limited firefighting resources, wildland fire management has evolved—out of necessity—into a cooperative interagency community effort. Perhaps the most widely known product of this interagency cooperation is the Alaska Interagency Wildland Fire Management Plan (AIWFMP). The AIWFMP consoli-

dated 13 “Area Specific” Plans and a 1984 amendment into one Alaska interagency plan, which has been in use since 1999. The Alaska Plan is viewed by many in the national wildland fire community as a model for interagency fire management.

On the Kenai Peninsula the Alaska Division of Forestry, the Chugach National Forest, the Kenai National Wildlife Refuge and the Kenai Peninsula Borough with all of its municipal and rural fire departments, work together under the umbrella of the AIWFMP and cooperative agreements to implement a successful wildland fire management program. Nowhere is this kind of cooperation and coordinated effort more important than on the Kenai—where a history of wildfire, a growing population and a complex of hazardous forest fuel types coexist.

Despite our cooperation on the Kenai and throughout Alaska, there is much room for improvement. Firefighting resources are often over-extended during periods of high fire danger, and interagency communications are at times—difficult. But we are constantly striving to improve our coordination and our response to the changing environment. And because we are, in many ways, isolated from the national fire organization, we have to do things differently to be effective. So maybe, being different as Alaskans isn't subconscious, maybe it's a necessity.

In my next article, I want to describe how Alaska and the Kenai Peninsula have been divided into fire management option areas: Critical, Full, Modified and Limited, as defined by the AIWFMP. These fire management options are reviewed annually by local fire management officers and land managers, and changed when necessary—in response to the changing environment. Until next time.

Doug Newbould is the Fire Management Officer at the Kenai National Wildlife Refuge. Previous Refuge Notebook columns can be viewed on the Web at <http://www.fws.gov/refuge/kenai/>.

Forest detective searches for “animal pollen”

by Ed Berg

Animal pollen? There is no such thing: flowers—not animals—produce pollen. OK, but let's ask if animals could produce something like pollen? Is there some kind of “pollen analogue” for animals?

Here is why the forest detective considers this question interesting. Pollen is like a time-travel machine for plants. Pollen is almost indestructible and it preserves very well in sediments at the bottom of lakes. As time passes, mud and pollen accumulate on lake bottoms like pages in a diary written over thousands of years. Unfortunately, the lake mud pollen diary is only about plants. I would like a similar diary about animals.

To see the power of this methodology, at least for plants, let me explain a bit about the mechanics of how it works. To collect lake sediments we extract a cylindrical core of mud by pushing a thin-walled tube down into the lake bottom. The tube is then pulled up, and the sediments are gently pushed out of the tube as a solid core. If the sediments are mushy, especially near the top, they are collected in small plastic bags, at 1-centimeter intervals.

To read the sediment diary we first extract the pollen with various acids and sieves, and then identify and count the pollen grains under a microscope. We might do this for 20 to 50 evenly-spaced intervals in a core, depending on interest and available funding.

Next, the mud layers must be dated using radio-carbon (C-14) dating. This dates the pages of the diary, and it is absolutely necessary. Visibly, the mud is clueless about its age: it could be 600 years or 6000 years or 60,000 years old.

Once the diary is dated, we have a story of the comings and goings of plant species around the lake for thousands of years. For example, in 1998 we took a 9-meter core from Paradox Lake, twelve miles north of Sterling. Scott Anderson and co-workers from Northern Arizona University have analyzed the pollen in this core and developed a 16,000-year record of vegetation succession since the end of the last ice age. In this core we can see that white and black spruce arrived about 8500 years ago. Prior to spruce forest, the countryside was shrub tundra covered by dwarf birch and willow, with lots grass, sage, and shrubs of the

blueberry-cranberry-Labrador tea family.

Scott Anderson also made a detailed study of forest fire charcoal in this core, counting the charcoal grains in 900 one-centimeter cookies sliced from the core. He estimated that fire frequency was low in the post-glacial tundra period, increased as shrubs became more widespread, and peaked when white spruce established. The fire peak generally tracks the Hypsithermal warm period of 7-10,000 years ago, which we know from other studies was a warm and dry period, with July temperatures for southern Alaska estimated at 2 to 7°F warmer than now. With the onset of cooler climate and a modern mixed spruce-birch forest, the fire frequency has dropped to nine fires per thousand years for the last several thousand years.

So, you can see that sediment cores can tell us a lot about the vegetation and fires, because pollen and charcoal preserve so well. Unfortunately, we don't yet know how to read an animal story in these sediments. That is why we need “animal pollen.”

Here are some questions that animal pollen might answer: when did moose arrive on the Kenai? Did we have many moose before European settlement? Historical records suggest that there were not many moose on the Kenai before late 19th century fires. For caribou, we know that the Dena'ina supplemented their salmon-based diet with caribou in the winter. When did the caribou arrive and did their populations rise and fall? What is the history of Kenai salmon and how did this affect the ebb and flow of different native cultures over the last 8-10,000 years that humans have inhabited the Kenai? What have the spruce bark beetles and other forests pests been doing for the 8500 years that spruce trees have been around to eat?

What might work as an animal analogue for pollen? You would think that there would be something insoluble in moose or hare pellets that would preserve through time, but alas those pellets seem to return all too efficiently to the soil from which they sprang.

Even though pellets don't preserve, however, it might be possible to find a record of fungi that live on the pellets. Fungi produce spores, which preserve almost as well as pollen. Researchers in the

Rio Grande basin have recovered spores of the dung fungus *Sporormiella* from lake sediments. The abundance of these spores declined sharply at the end of the last ice age, right at the time of the massive die-off of large ice-age mammals, such as bison, horse and mammoths. The spores reappeared when humans brought domestic grazing animals into the area several hundred years ago. If moose are a recent addition to the Kenai wildlife, we would expect a lake core to show a rise in dung fungus spores after their arrival.

We might also consider parasites. Some insects produce hard parts that preserve well in sediments. Scott Anderson, for example, found a 10,000-year record of caterpillar head capsules from spruce budworm (or a close relative) in sediments in a pond in Maine. The head capsules which look like tiny football helmets preserve just like pollen, and are extracted and counted in the same way. It would be nice, for example, if warble fly larvae which live under caribou skin produced some preservable hard parts. Goodness knows, enough warble flies are produced when 20,000 caribou pass by a pond in the arctic!

Midges (such as “no-see-ums” and non-biting chironomids) preserve well in sediments, and indeed this summer Canadian entomologist Ian Walker will be looking for fossil midges in Kenai Lake sediment cores as indicators of past climate. It turns out that midges are good water temperature recorders, with each species having its preferred temperature zone. Midges, unfortunately, are not associated with any particular animal species, so they tell us nothing about specific animals, although they are a good indicator of potential fish habitat.

In the past I always figured that the quest for animal pollen was something like seeking the Holy Grail. But now the Grail may be in sight, at least partially. Last spring as I was driving to work one morning I heard on the radio about a study that used fossil DNA in soil to look for extinct animals. This could be better than pollen, which in plants is often hard to identify to the exact species. Fossil DNA goes straight to the genetic identity of an organism; there’s nothing closer than DNA. When I heard this report on the radio, I cried, “Eureka!” and have been excited about the idea ever since.

DNA is a fairly tough molecule, compared to protein, and it sometimes survives well in fossils, especially in plant fossils, “Jurassic Park” notwithstanding. The idea that animal DNA might survive in soils, however, is a radical proposal, way out in left field. Soil sci-

entists like to think of soil as a living organism, filled with smaller organisms that are constantly ingesting, digesting, and excreting mineral and organic particles. Soil is not a favorable habitat for preserving big organic molecules like DNA and certainly not for proteins, carbohydrates, and fats. This is the biological meaning of, “Ashes to ashes, dust to dust,” heard at funeral services.

The report that I heard last spring described fossil DNA in frozen permafrost soil from Siberia and in cave soil from New Zealand. The permafrost soil yielded DNA from extinct woolly mammoths, bison, and horses, as well as from lemmings, hares, reindeer, and musk oxen, dating to 30,000 years ago. Plant DNA in deeper permafrost preserved much better, and yielded 19 plant types dating up to 400,000 years ago. The New Zealand cave soil dated to 3,000 years ago, and contained DNA from 29 plant types, as well as three types of extinct flightless birds called moas, and an extinct parakeet.

This soil DNA study, by geneticists Eske Willerslev from Denmark and Alan Cooper from New Zealand is a major milestone in paleoecology. Alan Cooper has received ample funding to set up a state-of-the-art DNA lab, called the Ancient Biomolecules Centre at Oxford University in England, and I am sure that we will be hearing a lot more about this kind of work in the future. As an application of DNA, it could well do for the study of past life what DNA has done for police work and criminal identification.

Unfortunately, the soil DNA method is presently limited to more-or-less protected soils, where the destructive activity of soil organisms has been inhibited, either by freezing (as in permafrost) or drying (as in cave soils). The animal DNA in soil probably comes from feces, where cells have sloughed off the gut wall and been carried out with the feces. The fecal material could easily be washed into lakes and accumulated in the mud, but its DNA might be damaged in the process.

Some lakes do not have an annual turnover of the water, which means that the bottom water is anoxic (no oxygen) and only very specialized kinds of organisms (such as anaerobic bacteria) can survive. This might be a better place to look for DNA in the sediments, than in a normal lake with lots of bottom dwellers processing the mud. Paradox Lake, where we have focused our pollen and charcoal studies, is a deep (51 feet) anoxic lake and would be a good candidate. It could potentially record 16,000 years of moose poop, if moose have been around that long. Humans, too, shed

some DNA, and there could be a DNA record of ancient lakeshore campers in that mud.

Soil DNA is about as close to “animal pollen” as the forest detective has been able to come. It’s not as user-friendly as plant pollen, but it could be a great start.

Ed Berg has been the ecologist at the Kenai National Wildlife Refuge since 1993. Thanks to Scott Anderson, Ted Bailey, Tony Fischbach, Edward Mitchell and Linda

Reinink-Smith for helpful comments on this article. Ed Berg will be teaching his 1-credit “Cycles of Nature” course at the Soldotna and Kachemak Bay campuses of the Kenai Peninsula College, starting March 31 and April 1, respectively. Recent bird sightings are on the Central Peninsula Birding Hotline (907) 262-2300. Previous Refuge Notebook columns can be viewed on the Web at <http://www.fws.gov/refuge/kenai/>.

Breakup means it's time for refuge crews to gear up for summer projects

by Bill Kent

We are seeing more and more of the sun, temperatures are rising and snow piles are shrinking. Everyone on the Kenai Peninsula is eagerly anticipating another Alaska summer. For the staff at the Kenai National Wildlife Refuge, this is the time of year when we begin to get very specific about summer work projects.

The visitor service division's summer plans are what I want to share with you this week. All of the other divisions (biology, fire, maintenance and administration) also are making plans for the summer, but I'll let those divisions speak for themselves.

Visitor services is preparing information and education materials for the more than 500,000 visitors who will use refuge facilities. Providing visitors with the most current information about refuge and peninsula opportunities makes a visit more enjoyable and offers an opening for each visitor to learn more about the mission of the Kenai National Wildlife Refuge. Plans for interpretive programs in our campgrounds and at the visitor center on Ski Hill Road are underway. These programs grow in popularity every year, primarily due (in my opinion) to the prep work that is done at this time of year.

My staff also is planning for a major effort on trails this summer. Congress generously provided funds for the rehabilitation of access areas, trail heads and trails along the Swanson River and Swan Lake roads. D & L Construction of Soldotna began work on the trail heads last fall and the trails will be worked on by that company and by Student Conservation Association (SCA) high school trail crews during the summer.

Trails in the Skilak and Tustumena lakes areas also will receive more attention, thanks again to specific funding from Congress. We will recruit a three- to five-person trail crew to supplement the usual back-country crew, which consists of a ranger and three

SCA resource assistants. We anticipate the announcement of the application period for the new crew will come soon. If you, or someone you know, possess the skills needed for trail work, call Refuge Headquarters and ask for Scott Slavik, who will lead the trail crews this summer.

The refuge cabin crew is preparing for another busy summer. They rehabilitated several cabins last year and already have begun to transport materials to other cabins scheduled for repairs or rehabilitation this year. For more information about cabin projects, call and ask for Gary Titus.

Last, but certainly not least, our law enforcement officers are planning their summer coverage of the refuge. We anticipate the usual crowds in the Russian River Ferry area, as well as full campgrounds. Cooperation with the Alaska State Troopers, Alaska State Parks, and the U.S. Forest Service is vital in their planning efforts to keep the visiting public safe and to ensure protection of natural resources.

The overwhelming majority of our visitors make every effort to abide by refuge and state laws and regulations. However, it seems that a few law breakers can spoil an experience for others, as well as jeopardize public safety. Our law enforcement officers encourage you to report violators to them or other enforcement personnel as soon as possible.

I hope I have provided you with some insight into the planning efforts we undertake each year to make your visit to the Kenai refuge is enjoyable and safe. Have a great summer!

Bill Kent is the supervisory park ranger for Kenai refuge. He and his family live in Sterling. Previous Refuge Notebook columns can be viewed on the Web at <http://www.fws.gov/refuge/kenai/>.

Reflections of two departing biologists

by Andy De Volder and Stephanie Rickabaugh

The time has suddenly arrived for us to bid farewell to the Kenai Peninsula, our home for the last ten years. Both of us have accepted positions with the U.S. Fish and Wildlife Service in Sacramento, California. Yes, that's right, California. 'NorCal' or 'Cali' as some locals call it, was not a first choice for us, but the job opportunity was just too good to pass up. In the federal service it is often necessary to go where opportunity knocks, if one wants to advance professionally. We are excited about seeing new country and new jobs, but we would like to reflect a bit on our time in Alaska and especially the Kenai Peninsula.

Back in the mid-1990s when we first arrived on the Kenai, most of the trees were still green, just like we were. We came from different states in the eastern U.S., and living in the wide-open expanses of Alaska was a dream that we independently shared. The only things we knew about Alaska were the stories we read and images we saw in magazines and in the 'Milepost.' Initially, like many people we know, we came to the Kenai Peninsula for summer seasonal jobs. I worked as a technician with Ed Berg researching the history of fire and beetle outbreaks in white and Lutz spruce forests on the refuge. Stephanie began as a Student Conservation Association (SCA) volunteer on the backcountry trail crew. She had the enviable job of being paid to canoe and hike refuge trails and stand in awe of some of the most beautiful landscapes on the Kenai Peninsula (and in Alaska) for an entire summer.

Stephanie's ambitions were in the wildlife field, and in 1996 she began working for now retired refuge biologist Ted Bailey as a wildlife technician. In the fall of that same year, after 3 seasons as a technician, I decided to return to school to pursue a master's degree. Stephanie stayed on the Peninsula and began working for ADF&G at the Moose Research Center (MRC) in the winters and the refuge in the summers. Stephanie was doing active field research in support of the refuge's lynx and hare studies; at the moose pens she basically oversaw the operation in the winters. She will always cherish the memories of long days (and some nights) spent locating and capturing lynx. I returned to the Peninsula during the summers of 1997 and 1998 to collect data for my fire history research and spent

the winters in Arizona (like many Peninsula snowbirds do).

In the meanwhile the spruce bark beetle outbreak was peaking. Our perceptions of the Kenai Peninsula, and our remembrances of our time here certainly include the beetle outbreak, but there is more to our story, such as the 296-pound halibut that Stephanie caught in 1997, or my ten halibut trips where I never landed a fish over 39 pounds. We spent summers hiking, berry picking and exploring the Kenai Peninsula from Seldovia to Portage. Nor can Stephanie forget the hours spent training moose at the MRC. We also traveled a bit around the state: up the haul road, New Year's in Chena Hot Springs when it was -59°F, and a week on Kodiak Island in August with sunshine and no rain.

In 2000 Stephanie was converted from a temporary seasonal refuge employee to a permanent seasonal employee, which meant an end to the hard (yet rewarding) winters at the MRC. I returned to the Peninsula in May 1999 and worked for the refuge fire crew for the summer. I jumped ship in September and began working for the Spruce Bark Beetle Office, Kenai Peninsula Borough where I set up the GIS (Geographic Information System) in the mapping shop, and helped to map over one half of the western Peninsula's vegetation types. The maps I produced were used in debates on the floor of Congress.

During our summers we both have fond memories of working on prescribed burns and wildland fire assignments on the Peninsula. In 2001, I worked on the Kenai Lake fire as a GIS specialist near Crown Point and one week later Stephanie was assigned to the Mystery Hills fire as the bear safety specialist. Combined, we have seen more of the refuge than many of the permanent staff members on the refuge today, including a large portion of the Tustumena benchlands, the entire canoe system, Chickaloon flats, and some remote areas in the mountains.

We truly believe that the Kenai Peninsula is one of the most special places in Alaska. As we reflect on our time here it is difficult to imagine living elsewhere. Here we have salt water, forested lowlands, mountains, alpine areas, glaciers and an abundance of

freshwater lakes. All of which are very accessible, and for the most part unspoiled. What a wonderful place!

Following the path where opportunity knocks, I worked briefly for the U.S. Forest Service in Seward, and then was able to get a permanent position as the GIS specialist at the Kenai refuge. There were however no such opportunities at the Refuge for Stephanie to move up the professional ladder. When a permanent biologist position opened in Sacramento, we decided to go for it. As luck would have it, I also found a job in the same Fish and Wildlife Service office in Sacramento.

No doubt in a few months as we sit in traffic and

complain about the heat, we will reminisce fondly about our years on the Kenai Peninsula. Its unspoiled beauty, unrivaled majesty, limitless opportunities for adventure and small town feel will be what we miss the most. Thanks to everyone who has helped us over the years and please keep in touch.

Andrew De Volder and Stephanie Rickabaugh both currently work in the Biology Program at the Kenai National Wildlife Refuge and will be relocating to Sacramento, California in early May. Previous Refuge Notebook columns can be viewed on the Web at <http://www.fws.gov/refuge/kenai/>.

Refuge takes a new look at cabin program

by Robin West

Cabins of various shapes and sizes have existed on Kenai National Wildlife Refuge for all of the 60 plus years it has been part of the National Wildlife Refuge System—and for many years before. Unlike adjacent lands, however, where the U.S. Forest Service, Kenai Fjords National Park, and Alaska State Parks have provided public use cabins by reservation and fee, the Refuge has maintained an informal program. Use of cabins on the Refuge has been available for many years on a first-come-first-served basis, without any fee or reservation.

Our cabins have received minimal maintenance by Refuge staff and volunteers, and have provided reasonable shelter for Refuge users, but never with any guarantee. Often a visitor might approach a cabin and find it occupied, thereby necessitating finding other accommodations for the night, or brokering a deal with the current occupant. While there may have been unwritten rules, no one could lay claim to any cabin at any time, so you could potentially have folks move in on you whether you liked it or not.

Other cabins, not maintained by the Refuge specifically for public use, have received occasional repairs by anonymous users that have kept them from falling down. And yet other cabins have deteriorated to complete ruins or have been lost due to vandalism or wild-fire. Many of these structures had historical significance and have been lost forever.

The informal approach the Refuge has historically taken on cabin management appealed to many users, but over the years we have come to believe that as cabins are lost, so too is a piece of the area's history, an opportunity for visitors to experience the Refuge in a unique way, and the safety that cabins can offer during emergencies. We are proposing a new course of action. We have completed some basic cabin maintenance the past two summers and have spent the better part of a year drafting a proposed cabin management plan.

The draft plan, if funded and implemented, would spell many changes for cabin management on the Refuge. The draft preferred alternative would place eight older existing cabins into a new reservation system. Three of them would be relocated to better locations in nearby areas. Two would be completely renovated or replaced.

Up to six new cabins would also be built and added to the reservation system. Proposed locations for these new cabins include Snag Lake, the Swanson River area, McLain Lake, the Headquarters area, Upper Ohmer Lake, and the Skilak Recreation area.

Three existing cabins (Emma Lake, Trapper Joe, and ENSTAR/Mystery Creek) would remain available on a first-come-first-served basis.

The Berg home cabin and Big Bay cabins on Tustumena Lake, the Andrew Berg cabin at the headquarters area, and the Harry Johnson trapping cabin in the Mystery Hills would be managed primarily for historic and interpretive values where day use would be emphasized. All of the cabins mentioned above would receive increased maintenance on a routine basis.

The draft plan is based on what we hope are the general desires of our visiting public, and what we hope we can accomplish given our financial resources. The draft plan is available now for a 30-day public review. We encourage everyone with an interest in the future of cabin management on the Refuge to “weigh in.” Please contact the Refuge to provide comments, and thank you in advance for your help in finalizing this plan!

Copies of the draft cabin plan are available at the front desk of the refuge Visitor Center on Ski Hill Road. If you e-mail a request to us at kenai@fws.gov, we can e-mail you a copy in .pdf format.

Robin West is the manager of Kenai National Wildlife Refuge. Previous Refuge Notebook columns can be viewed on the Web at <http://www.fws.gov/refuge/kenai/>.

When it comes to fire management, several options are available

by Doug Newbould

In my last Refuge Notebook article I wrote about the Alaska Interagency Wildland Fire Management Plan (AIWFMP) and how it provides a fire management framework to federal, state and Native landowners that is unique to Alaska. I also promised to describe the four fire management (suppression) options as defined in the AIWFMP, and how those options are applied to the landscape here on the Kenai Peninsula.

When the fire forefathers and foremothers got together to write the AIWFMP, their goal was “to provide an opportunity through cooperative planning for land manager-owner(s) to accomplish individual fire-related land-use objectives in the most cost-effective manner.” In the goal, “cooperative planning” refers to an annual requirement for fire managers to work with land manager-owners and review the fire protection needs on lands under their (mutual) jurisdiction.

This annual cooperative review is the opportunity for the land manager-owners to change the fire management option for a given area of land to best meet the land management objectives for that area.

When it comes to suppression, there are four wildland fire management options.

The critical management option is designed to give the highest priority to suppression actions on wildland fires that threaten human life, inhabited property, designated developments and structural resources (such as National Historic Landmarks). Communities, businesses and individual residences are protected under this option. Operationally, the critical option provides the strongest continuous suppression response from local, regional and national fire suppression agencies.

The full management option is for the protection of cultural and historical sites, uninhabited private property, high-value natural resources and other valuable areas that do not involve the protection of human life. The full option also can be applied to lands as a buffer of protection for critical option lands.

Some examples of areas protected under the full option include the Hidden Lake Campground, the Swanson River Oilfield and any historical cemetery site.

Operationally, full option areas receive the same initial attack response as critical areas, but if after the first operational period a fire escapes control efforts, a wildland fire situation analysis is completed and an appropriate management response is selected for the incident. This allows fire managers to focus fire-fighting resources where needed most.

Conversely, the limited option recognizes areas of land where the cost of suppression may exceed the value of the resources to be protected, where the exclusion of fire may be detrimental to a fire-dependent ecosystem or community or where the environmental impacts of fire suppression activities may be more detrimental than the effects of the fire. Designated wilderness areas on the Kenai Peninsula are generally managed under this option.

Suppression activities in limited option areas range from periodic surveillance or monitoring to containment.

In designated wilderness areas, suppression activities are restricted except where life safety is threatened. Fire-fighters use the least amount of force necessary to achieve fire management objectives in wilderness areas.

The modified option is a hybrid between limited and full. The modified option provides a high level (full) of protection to an area and its values when the fire danger is high and the probability of successful suppression is low. A lower level of protection (limited) is provided in an area when fire danger is decreased and the threat to resource values is low.

In areas managed under the modified option, the fire danger is evaluated throughout the fire season. When seasonal weather conditions or a lack of fire activity indicate a reduced threat, the protection level can be converted from full to limited.

Some of you might be thinking that this system of options is too simple or that it puts too many limitations on a fire or incident manager's response. And you would be correct, if not for a built-in flexibility mechanism called the decision criteria record.

This tool allows the land and fire managers to co-

operatively develop and document a decision to use a suppression response that is different than the selected fire management option.

The land and fire managers then prepare a wildland fire situation analysis to document the circumstances which require a different-than-planned response, to identify the incident management objectives and to analyze incident management alternatives.

These tools provide the flexibility that makes the AIWFMP such a useful and successful fire management plan in a state as large and diverse as Alaska.

A new fire management option wildland fire use,

has been added to the fire manager's toolbox through changes to national fire management policy over the past decade.

The Alaska Wildland Fire Coordinating Group is currently working to incorporate this new fire management option in the AIWFMP.

In a future article, I hope to tell you more about this new option and how it could be used on the refuge.

Doug Newbould has been the Fire Management Officer at the Kenai National Wildlife Refuge since 1999. Previous Refuge Notebook columns can be viewed on the Web at <http://www.fws.gov/refuge/kenai/>.

Gulls migrate great distances for summer on the Kenai

by Todd Eskelin

Spring has finally sprung and the first migrant birds have returned to the Kenai Peninsula. Many people would assume the first migrant species is a robin or maybe a Canada Goose. Actually, the goose is a very good guess and would net you the number two spot in the migration game. Number one on our list is the gull. Most people would say that gulls are not migratory, they are just dump birds. Well, after reading about some of the fascinating results from some early studies of gulls on the Kenai National Wildlife Refuge, you may have a different opinion of gulls.

In the early 1980s refuge staff and folks from the Migratory Bird office in Anchorage set out to learn about the colony of Glaucous-winged Gulls nesting on Skilak Lake. They found a similar colony on Lake Louise north of Anchorage and did similar studies up there, as well. I am only going to tell you about what they found with the Kenai population, but the Lake Louise population basically mirrored what was found down here.

The method these scientists chose to study the gulls was to band the chicks with a standard aluminum band on the right leg and a bright yellow plastic band on the left leg. The plastic bands had unique alphanumeric codes that could be read from a great distance with binoculars. So, toward the end of July and early August 1983 they banded a large number of gull chicks. They repeated this exercise again in 1984.

As the birds dispersed, reports began coming in from various locations where the color-banded birds were spotted. The researchers were shocked to discover that these birds actually migrated great distances each year and then returned to Alaska in the spring.

There were too many re-sightings to list individually, so I will just summarize the results. Basically, the young gulls would move up and down the Kenai River as soon as they could fly. They concentrated at the Russian River, the outlet of the Kenai River where it empties into Skilak Lake and down at the mouth of the river near the Port of Kenai. They hung around until the end of August and early September then started their journey south. Over the next two months, sightings were scattered from Kodiak to Prince William Sound.

By December the birds were moving through Southeast Alaska and British Columbia with a few arriving in California. The ultimate wintering grounds were split into several areas along the Pacific Coast, with concentrations on the Columbia River near Portland and another centered around San Francisco Bay on the California coast. Birds were sighted at these areas through February.

Surprisingly, there are no spring sightings of the banded birds on their northbound journey. No sightings were recorded until May, when they begin showing up around the Kenai Peninsula. It may just be a coincidence, but the birds might have routed over the Gulf of Alaska, making them impossible to view.

Gulls are slow to mature, and they don't actually return to the breeding grounds until they are around 5 years old. For the next few summers the banded birds spent summers around coastal Alaska and usually didn't return to their birthplace on the Kenai. Eventually, when they reached breeding age, many returned to the rocks on Skilak Lake.

The book record for the oldest banded Glaucous-winged Gull is 24 years 9 months. So, it is possible that some of the banded gulls are still around. While counting the gulls at the Skilak Lake colony a few years ago, I was able to spot several banded gulls. The plastic leg bands had all worn off, but the aluminum bands were still present.

So, as the migrant birds begin to filter in, take notice of the Glaucous-winged Gulls. These hardy birds have traveled a great distance to enjoy the beautiful weather and bountiful food that the Kenai Peninsula provides.

Also, remember to call the Central Peninsula Bird Hotline (262-2300) and report the first arrival date of any migrant birds in our area. The Kenai National Wildlife Refuge is sponsoring a contest for the person who documents the first arrival date for the most species between now and June 15th.

Todd Eskelin is a Biological Technician at the Kenai National Wildlife Refuge. He specializes in birds and has conducted research on songbirds in many areas of the state. Previous Refuge Notebook columns can be viewed on the Web at <http://www.fws.gov/refuge/kenai/>.

“Happy Trails to You,” “Clear the Road,” “Trails for All Seasons”

by Dave Kenagy

“The road was like that of yesterday, along steep hillsides, obstructed with fallen timber and a growth of eight different species of pine, so thickly strewn that the snow fell from them as we passed,” wrote Capt. William Clark on September 14th, 1805, in the heart of the Rocky Mountains.

Most of the roads in the days of Lewis and Clark are what we would now call trails. Somewhere along the way we have come to think of roads as routes suitable for automobiles. So changes the “National Vocabulary.”

But, some things don’t change. Many of today’s trails on the Kenai National Wildlife Refuge are routed along steep hillsides, and are often obstructed by fallen timber and encroaching alder, birch, and spruce trees. In time, these obstacles are removed by our backcountry crew, whose job it is to “clear the road.”

The trails that Lewis and Clark traversed in the West were defined not by axe and saw, but by footprints and hoofprints. But, the tools that their countrymen used back East to cut out new “roads” were not much different than those we use on the Refuge today.

Many of the trails on the Refuge have a long history, dating back to the early 1900s. They were made by hunters and trappers, and most were not made for horse use, but for hikers and packers. They are often winding and steep, and quickly ascend to the high country. The Bear Creek, Moose Creek, and Lake Emma Trails are examples of these early routes.

Of course, not all of the trails on the Kenai National Wildlife Refuge are so old. Most of the trails along the Sterling Highway and Skilak Loop Road were made about 50 years ago. The canoe portage trails, and trails along Swanson River Road and Swan Lake Road are about 40 years old. The Headquarters ski trails are about 25 years old. There are two Refuge trails that are less than 5 years old, and we have one brand spanking new trail that will be completed this year.

Refuge trails vary not only in age, but also in character and purpose. Wilderness trails are usually narrow, winding and steep as is appropriate for federally-designated wilderness, and are maintained for back-

packers and hunters. We do minimal work on these trails to retain their wilderness character.

Portage trails on the canoe system are designed and maintained so that folks can carry and maneuver a 50 to 80 pound canoe through the woods without mishap. So, most are fairly short, not too steep, and provide a relatively firm tread.

Refuge dayhiking trails allow hikers to quickly reach a fishing hole, a favorite berry patch, or a grand view. Most are in pretty good shape, but some are a little rocky, a little muddy, and sometimes disappear in a sea of grass and wildflowers during late summer. We clear these trails in early summer and improve them as time and budget allows.

The Headquarters area has nature trails, dayhiking trails, and crosscountry ski trails; that’s plenty of variety in a small area.

This year we will be improving a number of trails on the Refuge to bring them to a higher standard. That means reducing grades, improving drainage, straightening winding areas, re-routing where necessary, and improving the walking surface.

Two Student Conservation Association (SCA) trail crews will be upgrading trails along Swanson River Road and Swan Lake Road, and building a new trail from the Outdoor Education Center to the Swanson River. These trail improvement projects are part of a bigger package that includes upgrades to campgrounds, boat launches, and trailhead parking areas. A third SCA trail crew will complete the final portion of the Vista Trail, above Upper Skilak Campground, and will finish installing boardwalk on Hidden Creek Trail.

The backcountry SCA crew will do their usual trail clearing by removing blowdowns and obstructions from all major trails and the canoe system. A new 5-person backcountry trail crew will tackle a significant upgrade of a dayhiking trail, and possibly a wilderness trail as a part of a specially funded project to improve trails on the Refuge.

The second half of the Centennial Trail, at Refuge Headquarters, will be completed along with a portion

of the Keen Eye Nature Trail to give summer hikers and winter skiers a more interesting trip through the woods.

Portions of the Nordic Lake Ski Trail, at Refuge Headquarters, will be re-routed to provide an all-season trail which can be used by hikers as well as skiers. For skiers, the upgrade means straighter run-outs on slopes, gradual grades on uphill, and nicer skiing, in general. We will retain the woodsy character of the trail.

Most of these trail upgrades will be done with hand tools, just as trail work has been done for generations. But, where appropriate, we will use chainsaws, brushcutters, and even power machinery such as mini-

excavators.

We do all this to “clear the road” for you, and all the visitors who use trails on Kenai National Wildlife Refuge. If you see any of the trail crews this summer, stop and talk with them, and give them a big thank you. If you have any questions about our trail program, feel free to contact the Refuge and talk with the trail crew leaders: Scott Slavik, our backcountry ranger, or Dave Kenagy, our volunteer coordinator.

Dave Kenagy is a park ranger/volunteer coordinator at Kenai National Wildlife Refuge who has been working on trails at the Refuge since 1983. Previous Refuge Notebook columns can be viewed on the Web at <http://www.fws.gov/refuge/kenai/>.

What will our grandchildren see on the Kenai?

by John Morton

We all know that the Kenai is a wonderful place to live. We've got salmon and moose and bears, campgrounds, hiking trails, the Kenai River, Cook Inlet, the Kenai Mountains, and lakes of all sizes for boating. We've got places where we can snowmachine and places where we can find true wilderness. All these countless ways to recreate and most of it are within spitting distance of where we live and work. This is why the number of people who live on the Kenai has increased 22% in the last decade. It's also why 2.4 million people traveled down the Sterling Highway last year. They're all trying to get to this nice place we call the Kenai.

And every time somebody builds their home here, it's another septic field in the ground, another driveway, another acre carved up, more kilowatts, and more BTUs of gas. And every visitor puts demands on the resources, perhaps as another RV on the highway, another motorboat on the Kenai, one less red, or another night of full campsites. But new residents bring skills and expand the workforce; more visitors bring cash and help keep many of us employed.

So how do we find a reasonable balance? One innovative tool to help us find a solution is a computer model, called ALCES®, A Landscape Cumulative Effects Simulator. ALCES is a stock-and-flow model that was designed to track human "footprints" across the natural landscape.

Footprints are the artifacts of humans going about their business of living, such as seismic lines, roads, residential homes, trails, utility right-of-ways, oil and gas fields. The natural landscapes is what the Kenai looked like before we really started affecting the natural system: the 5.5 million acres of forests, wetlands, glaciers, streams, and lakes that are still mostly intact on the peninsula.

ALCES tracks human footprints on the landscape, and can cumulatively "grow" these footprints into the future, in response to different scenarios that we decide are plausible. Students of the computer game SIM-CITY will recognize this idea of experimenting with possible futures.

Suppose we think that the residential population on the Kenai will continue to grow by 2.2% each year

for the next 5 decades. What will our grandchildren likely see on the Kenai in 50 years? ALCES can help us forecast the demands on the utilities, predict economic growth, show us how forests and wetlands may change, and how critical wildlife species like brown bears may be impacted.

Several athletes from the Kenai competed in the Arctic Winter Games this past year in Fort McMurray, Alberta. This is also the heart of the burgeoning Alberta oil sands industry that is extracting oil at almost 1 million barrels per day. The population in Alberta is growing at 1.3% per year and the economy is growing by 3.2% per year. ALCES was originally developed in Alberta to specifically address these kinds of growth issues. Government agencies, commercial forestry, and oil companies have used ALCES extensively alike to help understand how their decisions today will affect the quality of life tomorrow.

Forecasting possible futures is a pretty tall order for any piece of computer software. It took two years out of the life of a pretty smart guy, Dr. Brad Stelfox, to develop ALCES, and several years of use by Canadian agencies to refine it. And it will take the experience and expertise of a lot of local professionals to ensure that the Kenai version has the proper data inputs and is running reasonable future scenarios.

The Refuge worked with the Kenai Watershed Forum to host two workshops in April of 2003 and 2004 to bring ALCES to the Kenai. Stephanie Sims, the new ALCES Consortium Coordinator at the Kenai Watershed Forum, is actively working to bring local experts from Federal and State agencies, Kenai Peninsula Borough, industries, and native governments to the table. I encourage you to look at <http://www.kenaiwatershed.org/effectsmodel.html>. It's an ambitious project, but one that I sincerely believe is critical to help us strategically plan economic opportunities while ensuring that the Kenai will be as nice a place for our grandchildren as it is for us.

John Morton is the Supervisory Fish & Wildlife Biologist at the Kenai National Wildlife Refuge. Previous Refuge Notebook columns can be viewed on the Web at <http://www.fws.gov/refuge/kenai/>.

Be nice to nettles!

by Ed Berg

Spring has arrived in full force and it's time to enjoy some nettles. "Enjoy some nettles?" you ask. "Isn't that like enjoying poison ivy or the seven-year itch?" No, Indeed! Nettles are one of the first and finest gifts of spring. Like many prickly types of our own species, you just have to know how to approach them.

Specifically, you approach nettles with gloves; throwaway surgical gloves are nice, but any solid glove will do. Nettles, i.e., stinging nettles, are covered with tiny stinging hairs called trichomes. Each trichome is like a glass hypodermic needle, complete with a little bulb of skin irritants (formic acid, acetylcholine, serotonin, and histamines) at the base of the needle. When skin brushes the leaf surface, the silica-stiffened trichomes break and inject their chemicals into the skin, and red welts instantly appear.

A few minutes cooking quickly breaks down the stinger chemicals and readies the fresh greens for the discerning palate. The easiest way to prepare nettles is to simply steam them for a few minutes like spinach, and serve with butter and salt, or perhaps olive oil and Parmesan cheese. Nettles are also rendered harmless by drying, which allows them to be used for soups during the winter.

Just about any recipe that uses spinach can be improved by using nettles. We have a thick patch of nettles around our driveway, and my wife Sara serves nettles in one form or another most evenings at this time of year, before the plants get tall. Nettle quiche is my favorite nettle dish, and I will try to describe how Sara makes this delicacy, even though she is not one given to precise recipe formulas.

Nettle Quiche

- Pie crust
- 3-4 cups of nettle tops
- Small onion
- Mushrooms
- Grated cheese, ¼ to 1/3 pound
- Fresh tomato
- Bacon bits
- 1 ½ cups of milk
- 4 eggs

Pick the top several inches from nettle plants that are less than a foot tall. Steam the nettles for several minutes until limp.

Stir fry the sliced onion and mushrooms.

Line the unbaked pie crust with grated cheese (cheddar, Swiss, pepper jack are good). Place the steamed nettles on top of the cheese, and cover the nettles with the fried onions and mushrooms. Slice tomatoes should be arranged prettily on top, and garnished with bacon bits.

Beat or blend 4 eggs and 1 ½ cups of milk (or sour cream or buttermilk) together, and pour over the whole pie, up to the edge.

Bake at 375 degrees until done, probably 35-40 minutes. Serve warm or cold. I add a touch of Tabasco sauce, but many would consider that barbaric.

As I noted above, it is best to use the youngest (top-most) part of the young plants. You can extend the useable life of your nettle patch during the summer by repeatedly mowing it, so that there is always a fresh crop of new shoots.

As the plants mature, the stems become very stringy. Nettle fibers are used to make "nettlecloth," just as flax fibers are used to make linen and hemp fibers are used to make rope and cloth. In the First World War the uniforms of German soldiers were

made of nettlecloth, due to a shortage of cotton.

Mature nettles also contain fine crystals of calcium carbonate called “cystoliths” which further reduce their palatability.

Nettles are indeed very well-defended plants and it’s interesting to reflect on the evolutionary significance of these defenses. The stinging hairs are a great defense against most herbivores (plant eaters). The moose in our yard eat just about everything else but never seem to get to the nettles. Goats however can eat nettles with impunity, along with tin cans. Goats are indeed highly evolved creatures.

The stinging hairs are a good defense against many leaf-eating insects, but some butterflies and moths (lepidoptera) have apparently evolved antidotes to the stinging poisons. The caterpillars of the black and gold Milbert’s Tortoise Shell butterfly (*Aglais milberti*) browse the leaves with relish. At first, the young caterpillars feed together within a loose tent made of silk threads. As they grow in size, the caterpillars disperse on their food plant and eventually make cocoons among the leaves. The bristle-covered caterpillar of the Red Admiral butterfly (*Vanessa atalanta*), which is black with red bands and white spots feed also on nettles in Interior Alaska. (To see dozens of pictures of these beautiful butterflies on the Web, do a Google search for the names, using the “Images” tab rather than the “Web” tab. They are very popular with photographers.)

In the plant world we often see evolutionary “arms races” between plants and the critters that eat the plants. At the moment, the butterflies are ahead of the nettles, and exploit their advantage by entrusting their children (eggs and caterpillars) to the nettles’ chemical defenses. If moose, however, could eat nettles, they would eat the butterfly eggs and caterpillars along with the leaves, so the safe haven nursery would be lost.

In the next round of the arms race, nettles may evolve a new poison that protects the leaves from caterpillars. This will of course work fine until the caterpillars evolve a new antidote. Alternatively, moose might evolve an antidote to nettle poison. On the Kenai, nettle-eating moose would be very bad

news for caterpillars, and the caterpillars might have to adapt to an entirely new plant. Then again, the caterpillars might evolve a taste so foul that moose would not eat the nettles if they smelled the caterpillars in the foliage.

These examples may seem far-fetched, but in tropical rainforests chemical ecologists have documented many such evolutionary tit-for-tats by looking at the sequences of precursor molecules that must be synthesized during the production of existing plant toxins. Each of the precursors was probably a temporarily successful defense against some critter, until the critter evolved a way of breaking down that defense. Nettles and their herbivores probably have a similar chemical history, but I don’t know if anyone has looked at it.

For most people the nettle rash disappears in a matter of minutes, but some people may suffer for a couple of days. One remedy is to squeeze the juice out of the nettle plant and apply the juice directly to the rash. Jewelweed (touch-me-not) and dock often grow in wet areas near nettles, and they can be crushed and applied directly to the rash. Jan Schofield in her book *Discovering Wild Plants* (Alaska Northwest Books 1989) also advises plantain and the scruffy coatings of fiddlehead ferns for nettle rash.

Finally, I should note that nettles provide abundant seed for small birds, and birds also forage on the caterpillars and other insects such as aphids that live on nettles.

In England nettles are appreciated as an important food for wildlife, as well as for humans, and British conservation website announces May 19-28 as National Be Nice to Nettles Week (<http://www.nettles.org.uk>), with a variety of nettle and wildlife activities planned for the week. We should have such a week on the Kenai, starting with a nettle quiche competition, or perhaps with a nettle version of the Greek spanakopita spinach and feta cheese pie. Yum!

Ed Berg has been the ecologist at the Kenai National Wildlife Refuge since 1993. Previous Refuge Notebook columns can be viewed on the Web at <http://www.fws.gov/refuge/kenai/>.

Ski Hill Road: the Central Kenai's favorite hiking trail

by Rick Johnston

If you live or work on the central Kenai, you may well have a favorite walking or hiking place on the Kenai National Wildlife Refuge. For many, it's a remote and solitary informal route in the hills and for others it's a well-maintained designated trail within one of the Refuge's wilderness areas. Others prefer a hike with a harvest goal in mind, such as the infamous Russian River confluence or its upstream reach. It may come as a surprise to some, but not to Soldotna locals or Refuge employees, that by far, Ski Hill Road is the most popular hiking route on the Refuge.

Braving roadside parking, slippery road conditions, dust, teenage speedsters, and big trucks we see the dog walkers, joggers, skiers, hikers, noon-time exercise enthusiasts, seniors, bicyclers, mothers with back-packed-babies in tow, 40-year-locals, tourists, high school track teams, and speed walkers. Originally the "secret" walking route of long-time residents like Marge and Peggy Mullin, Ski Hill Road has developed somewhat of a local cult following. Not to be outsmarted, first-time users can be seen weekly alongside veteran Ski Hill Roaders.

The attraction seems to be a "good surface in a great setting!" Year round walking/jogging near town through a pleasant forested setting with challenging grade and good footing is nothing to take lightly. With the Soldotna area encircled by deep snow in the winter and soggy marsh in the summer, nearby hiking opportunities like Ski Hill are worth their weight in expensive jogging shoes. Some people park alongside the road, others at Skyview High or at the Refuge headquarters. Still others jog or walk from home in Soldotna and top off a three-mile roundtrip with several additional miles on Refuge headquarters trails. Fitness/pain addicts love the long uphill climb from Soldotna and only wish it was slightly longer and steeper.

For background, Ski Hill road is located just south of the Soldotna city limits, looping south from Funny River Road by Spenard Building Supply to a point approximately 1.5 miles along the Sterling Highway, directly across from Skyview High School. It was part of the original Sterling Highway from Anchorage to Homer, constructed in 1949. Like other original cross-Peninsula highway routes through the Kenai National

Wildlife Refuge, such as Skilak Lake Road, Ski Hill Road has become a secondary recreational side loop, paralleling the newer straightened Sterling Highway.

Ski Hill Road gets its name from a long-gone ropetow and ski hill that was constructed in the 1960s. It was operated on Moose Range land under a special use permit issued to a local winter sports club. The ropetow ski area was a popular local venue for a short time in the early days of Soldotna. Later, a small network of cross-country ski trails was cleared, near the Highway Department's communications tower. The ski trailhead has been relocated, and the ski trails have been extended.

In 1979 U.S. Fish and Wildlife Service planners moved the Kenai National Moose Range Headquarter from Old Town Kenai to Ski Hill Road, utilizing government land close to town on a good road, with electric power, and float plane access. Over the years a variety of amenities were developed, such as a wildlife viewing area, a new nature trail, expanded Nordic ski trails, and the construction of the Refuge Visitors Center. A general population increase and the opening of Skyview High School in 1990 further added to the vehicle use of Ski Hill Road.

Almost every local driver and every Refuge employee has a horror story of nearly missing a walker, or slipping sideways in their vehicle on glare ice in the general direction of pedestrians in the road way. Conversely, almost every regular hiker has had to take evasive action from approaching vehicles not necessarily under control. A narrow and winding gravel roadbed with no real shoulders or sidewalks, and a steep grade all conspire to make Ski Hill Road seem awfully narrow when a descending driver faces an entire cross-country sports team on a jog, spread over the roadway.

Annually, numerous vehicles go in the ditch along the road due to loose gravel and/or ice and perhaps excessive speed. Some say it's a clear miracle that a pedestrian or multiple pedestrians have not been hit. Many inexperienced teen drivers have made their first "uh-oh" cellular call to dad from a Ski Hill Road ditch. And it is not uncommon that the first on scene person to render assistance is a walker or jogger.

Ski Hill Road remains a state highway right-of-

way although most maintenance, such as snow removal and sanding, is done by Refuge staff.

Starting with the anticipation of Skyview High School's opening in 1990, various proposals to increase safety by separating pedestrians and vehicles have been formally and informally discussed. Proposals have included blocking off one entrance to decrease traffic, blocking off about half of the existing road and making it a trail; converting the entire length to a trail and establishing a new Refuge entrance road straight in from the Sterling Highway, and establishing a parallel all-weather trail to physically separate vehicles and pedestrians.

State and Refuge officials are aware of the popularity of Ski Hill Road and of the need to enhance safety, and both have generally been supportive of some type of change in the through traffic situation.

Until the daily mix of pedestrians and vehicles can be remedied, drivers and walkers should be very aware of each other, and walk and drive defensively. Visitors to the Refuge either on foot, or by vehicle are always welcome. Sometimes, what attracts visitors to

the Refuge and what planners/managers think attracts visitors can be two different visions. With the abundance of trail opportunities, who would ever think a dusty old road would be so popular, but it is, and Refuge management is listening and determined in the long run to make Ski Hill Road safer.

Refuge users who have ideas for Ski Hill Road are encouraged to share their thoughts with Refuge staff or State Department of Transportation folks. Refuge managers and the public participants in the current Kenai NWR Comprehensive Planning Process will also have opportunities to discuss Ski Hill Road and other Refuge outdoor recreation opportunities.

If you would like more information concerning Ski Hill Road, Refuge hiking, right-of-ways, or access, or how to get involved in Kenai Refuge planning contact Refuge headquarters at 262-7886.

Rick Johnston is a Ranger/Pilot for the Kenai National Wildlife Refuge. Previous Refuge Notebook columns can be viewed on the Web at <http://www.fws.gov/refuge/kenai/>.

A warning about introducing exotic birds

by Todd Eskelin

The recent discovery of crawfish in a local stream stirred quite a reaction from concerned citizens. It exposed how easily threats can occur to the fish and wildlife that populate our watersheds. The crawfish story follows a disturbing pattern along with the illegal introduction of yellow perch and northern pike into local waters. The threat of such exotic fish to anadromous and resident fish species is well known and often discussed among fishermen.

The crawfish story also points out an often-overlooked problem that is very prevalent in Alaska and specifically on the Kenai Peninsula. Much of the attention on invasive species focuses on fish, plants, and insects, but invasive bird species are rarely seen as a threat to wildlife in our area. Only Rock Doves (pigeons) and European Starlings are listed as invasive species by various state and federal agencies.

Though pigeons and starlings do pose significant threats, there are many other introduced bird species on the Kenai that pose a risk to native birds, other wildlife, and even humans. Since the Kenai National Wildlife Refuge initiated the rare bird hotline in February, I have received numerous reports of birds that are not native to our area and in some cases not even native to North America. I recently had a pair of Chuckar land in my yard briefly and then fly off. There have also been sightings of Turkey, California Quail, Ring-necked pheasant, Bobwhite, and various ducks and geese.

I would like to believe that these birds have simply escaped from their pens and their release was a total accident. Unfortunately, it is more likely a case of well-meaning people buying and releasing the birds in an attempt to have them breeding in the wild. What is baffling to me is that we jump at the first sight of crawfish, yet we don't even bat an eye when an introduced bird walks across our yard. We still allow groups to purposefully introduce game birds into the local environment with little regard for possible problems that may arise down the road.

The introduction of Starlings into North America started with around 100 birds released in Central Park in New York City in 1890 and 1891. Europeans had recently settled in the New World and wanted to es-

tablish all of the birds mentioned by Shakespeare to bring a little flavor of home with them. This is not too dissimilar from people originating in the Midwest bringing a few yellow perch with them or Oregonians wanting a few Chuckar running around in their backyard.

There are conservative estimates that the Starling population has reached over 200 million birds since that initial release approximately 100 years ago. These birds out compete native birds for food and nest sites. Large flocks can devastate food crops grown for livestock and do considerable damage to fruit crops grown for human consumption. They are also vectors or hosts for a multitude of diseases. At least 50 different human and livestock viruses and diseases have been documented in the droppings of Rock Dove and Starlings in North America.

The list of viral diseases is especially disturbing. Viral diseases like yellow fever, dengue fever and many types of encephalitis have been isolated from Starlings. Starlings are also one of the many bird species documented as vectors for West Nile Virus. Starlings now range as far north as Fairbanks and south through most of Mexico.

This is just an example of how well-meaning folks release a few birds into the wild and the results can be devastating. There was no way to predict the harmful effects Starlings would have on our continent when those first birds were released.

So, is it worth the risk to plant a few rabbits or quail in your back yard if they could potentially eliminate native species from the enjoyment of our future descendants?

There are some simple steps to stop non-native species from getting established. Don't be tempted when the local pet store has a sale on Mallard chicks to buy and release them into the wild. We also should make a concerted effort to remove these birds from the wild when we see them. Give birds the same attention that we give to crayfish or northern pike. We may not know the exact risks they pose, but why wait until they are uncontrollable to react to the threat?

Todd Eskelin is a Biological Technician at the Kenai National Wildlife Refuge. He specializes in birds and has

conducted research on songbirds in many areas of the state. Previous Refuge Notebook columns can be viewed on the Web at <http://www.fws.gov/refuge/kenai/>.

Fire season calls for vigilance, cooperation

by Jeffrey R. Richardson

Wildfire is one of those events-like hurricanes and tornadoes-that many people don't think about until the season is imminent or already well underway and trouble is at the doorstep. Given life's tribulations, this is understandable. And, it explains why we've devised programs and services to help inform and prepare people for natural disasters, to help mitigate the hazards.

Kenai Peninsula, cooperating local, state and federal agencies have pitched in for the last several years to address a growing wildfire danger on public and private lands. The Kenai National Wildlife Refuge Fire Management Program has proudly served this effort with a number of projects. They include the Funny River Road firebreak and other mechanical fuel reduction activities, as well as public education, campground patrols and prescribed fire to reduce fuel loads and improve wildlife habitat.

We salute our colleagues in other agencies for parallel efforts to cope with the huge fuel loads caused by the spruce bark beetle infestation. The Alaska Division of Forestry heads up a comprehensive prevention and public education program. The agency for many seasons has fielded a fire suppression crew, trained and ready to respond to wildfires when needed, but also dedicated to fuel reduction projects throughout the region. The Kenai Peninsula Borough has been integral to this work, providing funding and coordination with various landowners. Others, including Homer Electric Association, have done their part with public education and clearing rights-of-way along borough roads.

Members of the public have an important role to play in this process of prevention and hazard mitigation, not only for the common good, but also for their own self-interest. This is especially true where neighborhoods are surrounded by forest. Reducing fuels around dwellings, landscaping with fire-resistant trees and shrubs, insuring that wood piles, oil and propane tanks and other flammable materials are stored away from the house, utilizing metal roofing-all are important for making homes and neighborhoods more fire-safe in woodland areas.

These fire-wise steps don't guarantee that your

home will be spared by a wildfire disaster, but they greatly increase the chances of a good outcome. Many people don't realize that firefighters, when confronted with a large wildfire moving rapidly through or towards a neighborhood have to employ the same triage techniques as emergency room doctors faced with a large number of trauma victims all at once, as in the event of a crash or battlefield casualties. Like doctors, firefighters have to ask: "With the resources I have at hand, in the time I have, how many homes can I save?"

Like the doctors, firefighters use objective criteria to produce the best answer possible without being overcome by the inevitable emotion of such a situation. So, as they deploy crews, engines, helicopters, they evaluate the homes in a neighborhood against the fire behavior and decide which homes have a reasonable chance of being saved and which may have to be sacrificed. And this evaluation is based directly on whether any given home is likely to be part of the overall solution, or part of the problem. Has the likelihood of ignition in the area immediately around the home been sufficiently reduced that firefighters can expect to save it without incurring an unreasonable risk to life and limb?

This selection process is not part of the job any firefighter enjoys. We all like to think: "Bring it on!" and have the confidence, the training, the equipment, the "right stuff" to carry the day. But, we live in a world of practical limitations: weather, time, energy, equipment and money can all run in short supply on any wildfire.

Programs like the Kenai National Wildlife Refuge Fire Management Program collaborate closely with our agency partners in order to improve our odds, to stretch the dollars. We welcome the cooperation of an informed public to give us that much greater chance of success.

Jeff Richardson is in his fourth season as a wild-land firefighter and has just completed several assignments for the KNWR Fire Management Program. Previous Refuge Notebook columns can be viewed on the Web at <http://www.fws.gov/refuge/kenai/>.

Cow parsnip soon to decorate Peninsula fields and scorch the uninitiated

by Ed Berg

The huge lush leaves of cow parsnip (pushki, *Heraclium lanatum*) are beginning to festoon Peninsula roadsides, especially south of Ninilchik and around Homer. In another few weeks the flat-topped heads of white flowers will be showing their faces, and unwary hikers and gardeners will be salving their rashes and blisters from too much pushki and sunshine.

I always have mixed feelings about this very showy plant. The smell of the foliage and the flowers certainly tell me that spring is well advanced, and I enjoy seeing the five-to-nine foot tall, white-crowned stems in thick swards along the Sterling Highway. In town, however, pushki is an aggressive competitor that loves disturbed soil of any kind. It is extremely hard to get rid of, once started in a garden. The thick roots need to be dug up in their entirety, because root fragments left behind will propagate new plants.

Then there are the skin burns. Some people are very sensitive to pushki and can experience serious burns, the effects of which can last for months. Pushki foliage contains chemicals called “furanocoumarins” which unite with the DNA in skin cells to make photosensitive compounds. When the skin is exposed to ultraviolet light (from sunshine), the skin “develops” just like photographic film, with effects ranging from red rashes to second-degree blisters several inches in diameter.

Pushki is a member of the carrot family (apiaceae or umbelliferae), and many members of this family can produce skin rashes or blisters. Celery pickers and grocery workers, for example, can experience photosensitized skin, and there are even reports of severe sunburn after eating celery soup, followed by sun exposure or a tanning session.

It is interesting to ask if this phototoxicity has any adaptive value for the members of the carrot family? Is this toxicity, for example, a chemical defense against some kind of plant-eating animal (herbivore)? First, we should note that bears and moose eat young pushki plants, apparently without suffering any kind of sunburn effects. Indeed, in the Lower-48 pushki is considered a valuable forage species for deer, elk, moose,

and livestock. A study in Glacier National Park found that pushki comprised 15% of grizzly bear diet, spring through fall. All this suggests that mammals, other than humans, are not bothered by any phototoxicity effects of pushki.

Nevertheless, you don’t see many insects eating pushki. A fascinating study of a close cousin, wild parsnip (*Pastinaca sativa*), found that the furanocoumarins were potent deterrents for most insects, but one insect has evolved the ability to break down the furanocoumarins and eat wild parsnip. This insect—a caterpillar called the “parsnip webworm” (*Depressaria pastinacella*)—also eats pushki. If we ever need a biocontrol agent for pushki, parsnip webworm would be a good place to start.

Both parsnip webworm and wild parsnip populations are locked in an evolutionary arms race, where different wild parsnip populations have evolved different mixtures of furanocoumarins to fight off the webworms. Only certain genetic lines of webworms can survive on particular genetic lines of wild parsnips. No doubt, future mutations will arise in the webworms, which will allow them to break down more furanocoumarins and eat a wider variety of wild parsnips. And of course mutations will arise in the wild parsnips that will counter-act the genetically-improved webworms, and the cycle will be repeated.

If we can generalize from wild parsnips, it appears that the defensive value of furanocoumarins is all about using ultraviolet light to poison bugs. Generally, insects are the main threat to plants, and the fact that many species in this plant family have furanocoumarin compounds strongly indicates that insect defense is the primary function of these compounds.

Human rashes and blisters thus appear to be an accidental by-product of the plant-insect arms race. Such philosophical conclusions will, however, provide scant consolation to folks sensitive to pushki rashes and burns. The first line of defense against pushki is keeping it off your skin. When hiking through fields of pushki, it is best to wear long sleeves and gloves, especially when the sun is shining and you would prefer

to be wearing shorts and a T-shirt. When you return home, take a shower with strong soap, and avoid further sun exposure.

My wife Sara has treated a number of patients with pushki burns over the years with various homeopathic remedies; often homeopathic Causticum is the remedy of choice, whose symptoms are those of potassium hydroxide or lye. Her favorite pushki burn story is about a Swiss youth working on a local homestead who spent a day cutting down pushki, wearing shorts and flip flops. The following day his legs were covered with huge blisters as much as an inch high. Treatment with Causticum and 24 hours reduced the blisters to normal size, with the blisters drying up completely in three days.

Despite its toxic properties, it is possible to eat pushki, with care. If you peel the outer stringy covering off the pushki stem (preferably with rubber gloves), you can eat the rather bland-tasting inner cylinder. The inner cylinder can also be stir fried or baked in casseroles, and generally used as a celery substitute. Jan Schofield in her book "Discovering Wild Plants" (Alaska Northwest, 1989) describes a variety of traditional medicinal uses by native peoples, including treatments for nausea, sore muscles, toothache, and the worming of dogs.

The common name "pushki" for cow parsnip seems to be a bit of Alaskan vernacular that reflects our Russian heritage. In Russian a "pushka" is a canon, with the plural being "pushki." These words are pronounced with the accent on the first syllable, i.e., PUSH-key. Alaska folklore says that when the Russian explorers on ships viewed the dead cow parsnip stalks sticking out of the hills, they were reminded of

little canons and called them "pushki."

Skyview High School Russian teacher Gregory Weisenberg, however, has proposed an alternative explanation. The green stems of pushki are covered with fine hairs, which give them a slightly fuzzy or furry texture. When the accent of "pushki" is shifted to the second syllable (push-KEY), we have the Russian word for "fluff," so that the name "pushki" might refer to its fuzzy texture rather than its canon-like appearance. I am not convinced by this explanation, however, at least because the fine hairs fall off when the stem dies in the fall and becomes most noticeable.

A third explanation of "pushki" comes from Russell Tabbert in his *Dictionary of Alaskan English*, who notes that the Russian word "puchok" (pu-CHOK) means a bundle, with the plural being "puchki." The flowers of pushki are distinctly grouped into bundles or indeed bundles of bundles. On the dead stalk we see the radiating rays of the old flower head, so it's not too much of a stretch to see these rays as bundles.

Language, however, is like a flowing river, into which you can never step twice, so these explanations must remain scholarly conjectures. They do, however, provide some appreciation of our diverse linguistic origins in Alaska.

Ed Berg has been the ecologist at the Kenai National Wildlife Refuge since 1993. Information on wild parsnip and the parsnip webworm came from May Berenbohm's website <http://www.life.uiuc.edu/berenbaum> at the University of Illinois. Gregory Weisenberg advised on the Russian language history. Previous Refuge Notebook columns can be viewed on the Web at <http://www.fws.gov/refuge/kenai/>.

Free fun on the Refuge

by Michelle Ostrowski

Summer is here. The kids are out of school, visitors are arriving, fish are in the Kenai River, the mosquitoes are out, and many people are looking for summer fun. In addition to the normal recreational opportunities on the 1.92 million acre Kenai National Wildlife Refuge, we offer a variety of free, fun, and educational summer activities for all ages.

Programs at the Refuge Visitor Center in Soldotna.

Films for all ages: Alaskan wildlife films are shown daily on the hour from noon until 4:00 p.m. These films are a great orientation to the Refuge, its history, and the fascinating wildlife of our great state.

For people wanting to stretch their legs: Guided nature walks on our “Keen-Eye” trail are held on most Fridays, Saturdays, and Sundays at 11:00 a.m., starting July 3 and running through August 15.

For children: There is a Junior Explorer program for ages four and older. Kids use a worksheet to explore Visitor Center displays. Once completed (takes 15 minutes), they receive a Junior Explorer button. There is a more in-depth Junior Ranger program for children, ages six to twelve, who will be in the Refuge for two or more hours. After a certain number of booklet activities are completed, they receive a Junior Ranger patch. Children can also pick up Junior Ranger booklets from camp hosts at Hidden Lake and Upper Skilak Campgrounds.

Programs in the Skilak Lake Recreational

Area.

Campfire programs: Hidden Lake Campground, Fridays and Saturdays, at 8:00 p.m. from June 25 to August 14. Campfire programs are also scheduled on July 10, 17, and 24 at Upper Skilak Campground. This summer our campfire programs feature topics including: bears, wolves, and salmon.

Join an interpreter for discovery hikes on Saturdays at 1 p.m.: Hike Burney’s Trail (at Hidden Lake Campground) for “Exploring Using Your Senses” on June 19, 26, July 10, 24, and August 7. Hike the Vista Trail (at Upper Skilak Campground) and learn about the “Hidden Creek Fire of 1996” on July 3, 17, 31, and August 7.

Refuge volunteers host several of our summer programs. Volunteers play a key role in creating interpretive programs and staffing our visitor centers. This summer our interpretive volunteers, Leah Rigall, Chelsea Aldrich, and Kendra Bush are very excited to share their wildlife programs with Refuge visitors.

For directions and more information about any of these programs and activities, please contact the Refuge at 262-7021. Save the dates and times and don’t forget to bring your mosquito repellent!

Michelle Ostrowski is an interpretive park ranger at the Refuge who has enjoyed leading campfire programs and discovery hikes since 1998. Previous Refuge Notebook columns can be viewed on the Web at <http://www.fws.gov/refuge/kenai/>.

Water anyone?

by Robin West

I recently found myself sitting on the shores of Skilak Lake about lunchtime. Reaching into my pack I pulled out a sandwich, an apple, and a bottle of water. I was enjoying the calls of the gulls and terns and taking in the lake scenery as I took a sip of water, glancing down at the label on the bottle. It read something like, “Bottled from clear mountain springs of Northern and Southern California.” I literally laughed out loud at the irony. In a way I suppose it was like a line from the Rhyme of the Ancient Mariner: “Water, water everywhere, and not a drop to drink.” I was sitting on the edge of a 25,000 acre pristine Alaskan lake, yet had paid good money for water in a plastic bottle from California! I started to contemplate that I had paid more per unit of volume for that water than for the gas I just put in my car (and winced at the price of). As I have become fond of saying lately, “What’s up with that?”

I know that my care in not drinking directly from most lakes and rivers, even in pristine areas, is warranted. I have suffered the ills of giardiasis twice in my adult life, and don’t care to again, but on the other hand, as a boy I never thought of such things (nor do I remember bottled water even being available in stores—coke yes, a bottle of water—get real!). Perhaps the water today is not as pure as it once was; perhaps we just know more today about the risks nowadays. I have heard it said that the water on Earth today is the same as was here three billion years ago. I don’t know about that, but I guess water does just get recycled through the atmosphere via precipitation and evaporation. Another way of thinking about this is that the water you are drinking today may have been the same water a dinosaur “passed” in a yesteryear. I’ll bet T. Rex didn’t drink bottled water from California.

Without a doubt water is one of the most critical, common, and valuable substances on Earth. It is also largely taken for granted. Water is found in all life: we humans are about 66% water and the average tree is comprised of approximately 75% water. It covers over 70% of the Earth, yet only 3% is fresh water, and only 1% is available for human consumption (the rest being stored in glaciers). The value of water is a given, considering that people like me pay big bucks to buy

a little bottle of it, yet we also use enormous quantities of it every day—an estimated 100 billion gallons of water are used each day to irrigate crops in the United States alone. And while we in Alaska have little near future concern for the availability of water, such is not true elsewhere in the world. “Water wars” are heating up through much of the American West. There are more of us humans arriving in this world every day and all indications currently suggest that we are facing generally a warmer and drier climate in the future. This suggests more demand for a diminishing product in many areas around the world.

The Kenai National Wildlife Refuge has several Congressionally mandated purposes, including the conservation of fish and wildlife populations and habitats in their natural diversity. One of the purposes that sometimes gets less attention, however, is the mandate to ensure water quality and necessary water quantity within the Refuge. This is an extremely important purpose, for without the needed quality and quantity of water our fisheries, and the wildlife and humans that depend upon them, are quickly jeopardized.

Water is truly the lifeblood of the Refuge. And while there is little many of us might be able to do in the near term to protect the quantity of water within the Refuge, we each can and should take individual responsibility to protect its quality. Little things like burying human waste away from water bodies and using care when fueling outboard motors near our lakes and streams can over time make noticeable differences in maintaining water purity. Collectively we can protect our tremendous water resources—one drop at a time.

And the next time you are stuck outside in a pouring rain, look upwards and give thanks, and open your mouth and enjoy a little free “Dihydrogen Monoxide”. Or, buy a bottle of your favorite brand at the local grocery store.

Robin West is the Refuge Manager of Kenai National Wildlife Refuge and freely admits to seeking help to avoid any future bottled water drinking problems. Previous Refuge Notebook columns can be viewed on the Web at <http://www.fws.gov/refuge/kenai/>.

The joys of camping

by Brenda Nichol

It's that time of the year again. Summer is here, the weather is fine, the fish are running, and everyone is looking to enjoy the great outdoors. During a summer at the Refuge headquarters, I answer hundreds of questions from people looking to get out and enjoy, not only the Refuge, but other agencies' recreational opportunities as well. I've become quite adept at giving the right information on where to go for hiking, hunting, fishing, and camping. Telling someone what campsites are available is like trying to explain where the fish are in the river at any given moment. Since I have been working here, I have noticed a few trends. Where to find a campsite on the Refuge tends to depend on the weather, on the holiday, or on the fish.

When the snow starts to melt off and last year's dead grass is starting to peek through it, the phone calls start to come in. "Where can I go camping?" "Are your campgrounds open?" "Is the ice off Hidden Lake?" "Can I make a reservation?"

The reservation question has become more and more frequent over the past couple of years. Reserving a campsite on the refuge is not a problem as there is no reservation system whatsoever. Although three of our most popular campgrounds are fee based, all of the Refuge's campgrounds are on a first-come, first-serve basis. Hidden Lake, Upper Skilak, and the Russian River (at the ferry) Campgrounds charge a fee, ranging from \$5 for a walk-in tent site at Upper Skilak to \$12 for a motor home site at the Russian River.

It seems that trying to get a campsite before or during one of the three big summer holidays is difficult, to say the least. The best advice that I, or any member of the staff, can give you is to "get there early, pay your fee and stay put." Campground hosts and rangers are available to assist you at Hidden Lake and Upper Skilak.

The Chugach National Forest however does have a reservation system and it pays to use it. You can go on line to www.reserveUSA.com or you can call the National Recreation Reservation Service at 1-877-444-

6777 to get a campsite at one of the Chugach campgrounds.

Although I don't have many experiences camping out, I have enjoyed a few of the Refuge campgrounds over the years but never during any of the big holiday weekends. Like many of you, I want to get out and enjoy the summer. Up until now, all my camping has been accomplished in a tent, sleeping on the hard ground with a rock the size of a Hideout Mountain poking you in the back as you toss and turn while trying to fall asleep. You get up early because you are either freezing half to death or your back is aching from trying to sleep on that rock and you just can't stand to lie there any longer. The morning is usually cold and brisk, and once you get over the initial shock of dressing, you can step outside and enjoy the sounds of nature waking up.

It wasn't until last weekend, when I had the opportunity to go camping in a motor home, that I realized that there was something "basically wrong" with the finer side of camping. Maybe it was the noise of the generator as we fixed dinner, or the sound of the fan as it circulated overhead as we slept. I don't know. I missed hearing the sounds of nature but at least one thing remained constant, I still woke up with a sore back.

This weekend, I'll be outside enjoying a holiday weekend and, no, not from my back porch either. Unfortunately you won't see me in any of the Refuge campgrounds. I played it safe and made a reservation at one of the Chugach National Forest campgrounds. Get out and go camping even if it's in a tent, a motor home, or sleeping bag out under the stars (OK, so there aren't many stars to be seen at night during an Alaskan summer). You can't beat camping. There is so much to do and enjoy out there. Just get out and do it!

Brenda Nichol, Refuge Clerk, has been at the Kenai National Wildlife Refuge since January 1989. Previous Refuge Notebook columns can be viewed on the Web at <http://www.fws.gov/refuge/kenai/>.

Opening day memories

by Robin West

The morning of August 10 last year found me making oatmeal and hot cocoa over a small camp stove on a hillside outside our lightweight nylon tent. Once breakfast was prepared I reached in the tent and gently shook my 13-year-old son awake. The day was going to be a hot one. Yesterday we had hiked to our campsite near the Indian Creek Glacier; the evening before we had motored across Tustumena Lake and hiked up to Lake Emma.

Temperatures had reached the mid-80s, making the climbing slower. Today was going to be no different, though we had no plans to hike far; rather, we would spend most of the day glassing for mountain goats. In my son's pocket was a goat permit for the area. He also had a harvest ticket for a Dall sheep and a registration permit for a cow caribou. We were looking for goats, but if a full curl ram appeared we would change course, or if we were unsuccessful with sheep and goats, we might look for a caribou on the hike out.

After breakfast we stuffed our gear for the day into our packs and worked our way to the end of a vegetated escarpment where we spent much of the day with binoculars glued to our eyes. We spotted several goats—all were tucked away across the gorge we sat beside, and high up along waterfalls and cliff faces. It was too hot for the goats to move much. Later in the evening we did spot a few goats on our side of the gorge a couple of miles away. We decided to try to find them the next day.

It took several hours the next morning to work our way into position where we had last seen the goats, but they were not there. Carefully we moved along the rim of the gorge, peering over the edge here and there looking for any sign of the animals we were seeking. Eventually we found them, lying among some boulders immediately below us. The animals were nannies with kids, however, and we watched them for a time without disturbing them. Female goats were legal, but not if they had young, and we were looking for a billy anyway.

We spent several more days hiking and glassing the countryside. The weather turned and we spent one long night in our small tent escaping the wind and

rain. The goats remained in inaccessible places, but we did supplement our dried food diet with blue berries, and with ptarmigan my son shot with birdshot in my .44 magnum revolver.

We saw eight Dall sheep rams, but none of them were “for sure” legal. Their horns must complete a 360-degree arc for the animal to be fair game. On the hike out we also saw a herd of caribou, but as irony would have it they were all bulls, of no use for our cow permit. It mattered little, anyway. We had seen much game and enjoyed some of the most beautiful country in the world. We had tasted some wild foods, drank clear clean water from a spring, basked in the sunshine on red-carpeted tundra, got some great exercise, and enjoyed each other's company. We had made memories.

On a later trip in the fall my son took his first black bear. That trip too created great memories and resulted in some of the best summer sausage our family has ever eaten. The bear hunt was no greater a success though than our earlier outing in search of goats. Each and every trip into the Alaskan wilderness with close friends or family can and should be a success, whether you take game or not. These are special times—times that allow for a degree of closeness, peace, friendship, honesty, and awareness that are hard to replicate in today's hustle and bustle.

Not everyone is able to backpack into the mountains, and not everyone will choose to go hunting, but my hope is that everyone will take advantage in some fashion of the many blessings offered by the great outdoors and our local wild creatures. Take the time to get out with special friends or family, to hunt or fish, to camp or hike, to look for animals or take pictures, to go canoeing or rafting, to picnic or just go for a drive. If you do take the time, you too will be rewarded with something of infinite value: precious memories.

Robin West is the Manager of Kenai National Wildlife Refuge and enjoys sharing his love of the outdoors with family and friends. Previous Refuge Notebook columns can be viewed on the Web at <http://www.fws.gov/refuge/kenai/>.

Can I see the Refuge from my recliner?

by Kimo Rogala

"There's a baby moose outside our window!" proclaimed my roommate one morning. We both ran over with our cameras, ready to start shooting while letting out "Oohs" and "Aahs." It had been several weeks since calves started dropping and it seemed that everyone had seen a baby moose except me. I had spent many waking hours intensely surveying the landscape whenever I went hiking, driving, or fishing with no luck.

Yet, here was a moose calf right outside my bedroom window. "How's that for convenient wildlife!" I remarked to him. "Maybe I should just sit in front of the window on my days off and let the wildlife walk by it." If I bought a reclining chair with the cooler in the armrest, I wouldn't need to move for hours. Better yet, to improve my wildlife viewing opportunities, I could buy a big screen TV and a nature video and place them in front of the window.

I suppose that there is a bit of laziness in all of us at times. Who wouldn't want to see a brown bear on the side of a road while driving, or a pacific loon across the lake from our front porch? I myself, being originally from Southern California, am known to drive the car from one side of the mall to the other instead of walking, as would any reasonable person.

Yet, arriving on the Kenai Refuge several months ago as an intern, it struck me that Southern Californians are not alone in their habitual desire for the easiest and quickest way to do things. The Russian River Ferry strikes me the Alaskan version of driving across the parking lot. Every year thousands of people pay a fee to be shuttled across the Kenai to plunk their line ten feet from the bank in hopes of having a 3/8-inch gapped hook drift with the current into a salmon's mouth. Having partaken of this wonderful ritual, I was proudly boasting to a friend on the return ferry trip that I bagged my limit in 2 hours. Upon which I was one-upped by several long-time locals with times under an hour, proving that "quick and easy" isn't just for Southern Californians. Since then, however, a new perspective has slowly been creeping into my psyche.

When I first arrived, my impressions of the Kenai Refuge were of flat marshy and forested areas, with a bunch of lakes, a popular fishing river, and moose all

around. These are typically the things that most people see when they visit the area. Since then, I have spent several months traveling around the Refuge to survey various species of flora and fauna. In that time I have discovered that Kenai National Wildlife Refuge is a "miniature Alaska," including within its borders every major Alaskan habitat type. Viewing such a large diversity of habitats and wildlife in a relatively small area is like looking closely at a diamond and discovering its many facets, each with its own sparkle. Let me tell you about some of the "sparkles" that occur on the Refuge.

Ice fields and glaciers occur along the eastern spine of the Kenai Peninsula. They include the Harding Ice Field at 6500 feet, whose lobes form the Skilak Tustumena glaciers. Mountain goats, brown bears, ravens, ptarmigan, and iceworms inhabit this high country. Mountain tundra begins at between 1500-2000 feet and continues to the snow and rock fields of the 4000 feet peaks of the western Kenai Mountains with Dall sheep, caribou, hoary marmots, wolverine, and brown black bear.

Northern boreal forest occurs from 2000 feet down to sea level, consisting of white and black spruce, birch, aspen, and cottonwood forest in various stages of succession. This habitat is an important source of food and shelter for moose, brown black bear, lynx, wolves, coyotes, porcupines, weasels, red squirrels, and snowshoe hares. Summer migrant birds in the boreal forest include orange-crowned and myrtle warbler, olive-sided flycatcher, fox sparrow, and ruby crowned kinglet. Year-around birds that frequent the boreal forest are such species as great horned owls, hairy downy woodpeckers, spruce grouse, red-breasted nuthatches, and boreal and black-capped chickadees.

Lakes and wetlands occur throughout the northern portion of the Refuge. Hundreds of small lakes are surrounded by wetlands or spruce/hardwood forest hills. The wetland habitat supports migratory breeding birds such as common and pacific loons, grebes, trumpeter swans, and sandhill cranes, as well as moose, beaver, muskrat, and mink.

A major saltwater tideland is located at Chick-

aloon River Flats on the south side of Turnagain Arm. This tideland is the northernmost pristine saltwater wetland on the Kenai Peninsula and serves as a staging area for thousands of shorebirds and waterfowl.

Nine river drainages occur on the Refuge including the world famous Kenai River. Salmon, trout, moose, beaver, mergansers, and harlequin ducks are among the commonly seen wildlife throughout these river systems.

Two weeks ago I was working on a picturesque glacial moraine east of Tustumena Lake wondering, "Why don't they put a road out here so everyone can see the diversity that this refuge has?" Those old thoughts based on inertia and laziness had crept back into my consciousness. Then it occurred to me that I was glad there wasn't a road here cutting through the landscape. Would I rather have hundreds of people with cars and buses all around or only myself and the few intrepid souls willing to make the extra effort to

see this isolated and pristine wilderness?

Inaccessibility has benefits in rewarding only those who are willing to make the commitment to get there. Being at a site that many would like to see, but few have actually seen, is akin to an explorer's first arrival at a new land. So, next time you are driving on Sterling Highway take a look out towards the horizon and know that there is a whole undiscovered world of the Refuge available for viewing, if you are willing to get off your recliner. Even if you choose not to inspect the remote facets, know that they are out there, sparkling facets of the diamond we call Kenai National Wildlife Refuge.

Kimo Rogala is a seasonal biological intern at the Kenai National Wildlife Refuge. He recently graduated from San Diego State University with a bachelor's degree in zoology. Previous Refuge Notebook columns can be viewed on the Web at <http://www.fws.gov/refuge/kenai/>.

Combining work with play—experiences of a U.S. Fish and Wildlife Service Student Trainee

by Heather Knudsen

Two years ago at the University of Montana, my advisor approached me and suggested I apply for the U.S. Fish and Wildlife Service SCEP program. And what is the SCEP program? I asked. After doing some research, I discovered that SCEP stands for Student Career Experience Program and that it was designed to help the Service bring in motivated, talented students with a background in biological sciences. Each summer SCEP students get placed in different refuges to gain a variety of experiences, and upon graduation the students are placed permanently within their assigned Region. (Alaska is Region 7.) Wow, I thought, this sounds pretty good! Pretty good was an understatement; being a SCEP student has been an amazing experience.

I applied to the program as a first-semester freshman, but I was not accepted on the basis that I had not yet proven my dedication to wildlife biology. Instead of offering me a permanent SCEP position, I was given a temporary biological technician position with Yukon Flats National Wildlife Refuge. This position proved ideal at the time because I worked on seven different projects within three months. Lending a hand wherever it was needed and hopping around from project to project afforded me insight on various field operations. Working with waterfowl, wood frogs, aquatic vegetation, and Alaskan native youth, I learned not only about scientific techniques, but also about cross-cultural communication and cooperation. I had a great foundation from which to work after my first summer with the Service.

Persisting in my goal of becoming a SCEP student, I re-applied in my sophomore year and accepted. My first placement brought me to Togiak National Wildlife Refuge, based out of Dillingham. Unlike my summer at Yukon Flats, I worked on just two projects, and I wouldn't have wanted it any other way. This allowed me to delve into and truly understand each project.

The first month I counted sea bird colonies at Cape Pierce, one of the most incredible natural areas I've ever seen. This project has monitored the sea bird populations for many years. I counted common murre,

black-legged kittiwakes, and pelagic cormorants. Each of the other two technicians on the Cape had a project of their own. One of them surveyed nest success of common murre and black-legged kittiwakes, and the other counted the walrus and seal populations.

Originally I thought I would be living in a tent, as I had at my other field camps. But I wasn't too disappointed when I learned that I would have a small cabin all to myself. The other two biological technicians lived in the larger cabin next door. We were the only residents on the entire Cape—human residents, that is. Each day on my hiking route to count birds on the cliffs, without fail I would see grizzly bears with cubs, red foxes with kits, caribou, hoary marmots, walrus, and puffins. Not to mention the beautiful views of Cape Newenham and numerous other species. It was a wildlife paradise, and I loved every minute of it.

Next I flew to the Kanektok River where I worked on an escapement weir and tagged Dolly Varden. This is a joint project between Alaska Department of Fish and Game, U.S. Fish and Wildlife Service, and the Native village of Quinhagak, which occurs annually to monitor the fish populations. Two years ago the Dolly Varden project undertook to learn more about the Dolly life cycle. Each of the three rivers on the Togiak Refuge (Good News, Togiak and Kanektok Rivers) use a different color tag on the Dollies to see if they return to their respective natal streams.

Just like Cape Pierce, the Kanektok River was spectacular. We had thousands of fish passing through the weir everyday while I was there. Unlike most rivers, the Kanektok is home to all five species of Pacific salmon, making it a world class fishing river. If you prefer trout fishing, the Kanektok can fulfill that desire as well. There are plenty of beautiful rainbow trout, not to mention Dolly Varden, whitefish and grayling. This river blew me away with the amount of life it could sustain. The river itself is not very large, nor is it deep, and it is crystal clear. Because of this, almost everywhere I looked I could see schools of fish. I fell so in love with the project and the river that I have to return, so I am spending my last two weeks in Alaska

this year volunteering for the Kanektok River weir.

Currently I am working with Law Enforcement on the Kenai Refuge. How did I change from wildlife biology to law enforcement? Well, at the SCEP orientation meeting my first summer, Jill Birchell, a special agent based in Anchorage, gave a talk about the law enforcement aspect of the U.S. Fish and Wildlife Service. I found myself intrigued by her presentation and wanted to know more. I asked to job shadow her for a couple of days that summer, and she agreed. Jill introduced me to a new realm for applying my wildlife biology background, and I found it fascinating. After two summers of biological technician work, I decided it was time to branch out and see if law enforcement really was for me.

Now that I've gotten a taste of Refuge Officer work, I can definitively say that I would like to pursue a career in law enforcement. There is always something to look forward to, and we do something new and exciting nearly every day. During the peaks of the fishing season, we spend most of our time on the Kenai and Russian Rivers looking for fishing viola-

tions. Some of you may have seen me walking along the river banks or pretending to fish at Moose Range Meadows. Other days we patrol the refuge by truck, foot or canoe. We spend the majority of our time outdoors, which is exactly where I want to be. Rain or shine, this job definitely beats sitting behind a desk eight hours a day.

In a few short weeks I will return to Missoula for my last year of undergraduate studies. When I graduate in the spring of 2005, I could be placed at any of the 16 refuges in Alaska, according to positions available. Whether wildlife biology work or law enforcement, my next placement will be a more permanent position. Each refuge has something unique and special to offer, so I look forward to wherever my placement brings me.

Heather Knudsen is working at the Kenai National Wildlife Refuge as part of the Student Career Experience Program. She is a senior at the University of Montana. Previous Refuge Notebook columns can be viewed on the Web at <http://www.fws.gov/refuge/kenai/>.

Ancient bent trees at treeline are straightening up, tell of climate change

by Ed Berg



Ed Berg with release mt hemlock. USFWS.

You may not have noticed it, but treeline is going up on the Kenai Peninsula. Some years ago Yule Kilcher, a Swiss homesteader in the Homer area, pointed out to me the rising treeline on the mountains across Kachemak Bay. Since then I have sampled spruce trees at many treeline sites from Kachemak Bay to the Mystery Hills and have always found the highest trees to be young in age.

A rising treeline is not surprising in Alaska, given our accelerating climate warming. Treeline probably began to rise about 150 years ago with the end of the Little Ice Age. In the 1850s Kenai mountain glaciers began to pull back, and shrubs and black spruce forest began to invade the extensive sphagnum moss peatlands on the Kenai lowlands. The last couple of decades have seen much more recruitment of seedlings above treeline, the glaciers are pulling back faster (e.g., Portage glacier), and ponds and close-basin lakes are drying up from increased evapotranspiration during our record warm summers. The warming is speeding up, it would seem.

Recently we have been studying another barometer of climate change on the Kenai: the disappearance of “krummholz” tree growth at alpine treeline. Krummholz is German for “twisted wood,” which refers to the more-or-less horizontal growth of trees

at wind-swept alpine treeline sites. Krummholz trees are often found hunkered down in swales and hollows where the snow is deeper and lasts longer than on the open tundra slopes. The twisted horizontal growth occurs when the normally upright tree tip or leader is blasted by wind-driven ice crystals during the winter. This winterkill of the leader prunes the top of the tree and promotes fuller growth of lower branches, a phenomenon well known to gardeners.

On the Kenai we usually see a band of mountain hemlock above spruce treeline. When you drive through the mountains on the Sterling Highway you can see the darker green hemlock (with no beetle kill) above the lighter green white spruce, and at Turnagain Pass you are right up in the mountain hemlock zone.

On an exposed slope at the top of the mountain hemlock zone we often find a krummholz belt of bent over hemlocks snaking along the ground. These twisted gnomes are very slow growing and can be very old; we have tree-ring dated krummholz trunks north of the Skyline Trail to the 1500s, even though these trunks are only five or six inches in diameter.

Now, here are the key observations: Kenai mountain hemlocks aren’t doing krummholz anymore. Baby hemlocks now grow straight up at treeline and have probably been doing so for much of the 20th century, to judge from the upright saplings growing amidst the krummholz ancients.

Furthermore, we now see old krummholz trees turning upright and producing normal vertical trunks. Trunks may hug the ground for as much as eight or ten feet and then sweep upward into the vertical mode. Trees normally grow upright in response to gravity, because cells in the growing leader are gravity-sensitive and will elongate opposite the force of gravity. This means that each year a tree will try to put out an upright leader, even if it gets pruned back every winter.

When we see many krummholz trunks turning upright, and their offspring all growing upright, we can infer that climatic conditions have somehow moderated or ameliorated to allow this upright growth. Ulti-

mately this amelioration is probably due to increased temperature, but exactly how this increase translates into improved tree growth needs further study. For example, warmer winters should produce more snow (and wetter snow) which could protect treeline trees from wind damage, and provide more water for spring growth. Reduced winter wind would obviously reduce wind damage, although I am not sure that warmer winters would necessarily have less wind.

Plant physiologists have long pondered the origin of treeline. Just why do trees stop growing at a certain elevation on a particular mountainside? One popular theory is that the growing season becomes too short for needles to form a thick enough waxy skin or cuticle. If the cuticle is too thin, the needles will lose too much water during the spring when they warm up and become active, but are unable to pull up water from the frozen soil. This “spring desiccation” problem could be substantially reduced with warmer summers and a longer growing season that allowed a protective cuticle to be fully formed.

Whatever the climatic cause, treeline will be higher for the next generation of trees on the Kenai. Indeed, it appears that white spruce has essentially leap-frogged over the narrow mountain hemlock zone, krummholz and all, and is starting to grow above the hemlock zone. We recently observed a dramatic example of this rapid advance in the headwaters of Mystery Creek, north of the Skyline Trail. The mountain hemlock krummholz zone is well developed on the north-east flank of the mountain at 650 to 800 meters elevation. For at least 100 meters above the top of the hemlock krummholz we saw abundant white spruce seedlings (up to three feet tall), and lesser numbers of hemlock seedlings.

A really severe, low-snow winter would probably kill these seedlings, but we saw no cohort of dead seedlings that would suggest that such a winter has occurred in recent years. Our winters have been dramatically milder since 1977, when North Pacific sea surface temperatures warmed, following the half-century

cycle of the Pacific Decadal Oscillation (PDO). Most of the seedlings that we are seeing above treeline have probably established in the post-1977 warm period.

In California U.S. Forest Service ecologist Connie Millar has studied krummholz changes with white-bark pine in the high Sierras, and has correlated these changes with 20th century climate patterns. She found that krummholz whitebark pines produced vertical branches (“flags”) primarily during the period of 1945 through 1976, when the PDO was in its cool phase. Unlike the Kenai, the vertical branching in the Sierras has declined substantially during the recent warm phase of the PDO, from 1977 to 1998.

Chris Fastie, who worked with me as post-doc at the Kenai Refuge in the mid-1990s, and his wife Andi Lloyd have been studying rising treeline at various sites in Interior Alaska. They too have noted a decline of new krummholz in recent decades, and that young trees at and above treeline are mostly growing upright.

Studying treeline changes on the Kenai would make an excellent thesis project, for a hearty foot-propelled graduate student who would enjoy spending a summer or two in the alpine. To get such a study launched, I am looking for more treeline sites that show upturning krummholz trunks (flags), as well as seedling recruitment above treeline. Hunting season will soon be opening in the high country, and I would greatly appreciate any tips from treeline hunters and hikers who might find some good examples in their travels. Photos and GPS coordinates would be especially useful.

Connie Millar’s treeline studies in the California Sierras are summarized at <http://www.x-cd.com/mcss04/papers/P47.pdf>. Chris Fastie and Andi Lloyd describe their Alaska tree line studies at <http://cr.middlebury.edu/biology/treeline/index.htm>.

Ed Berg has been the ecologist at the Kenai National Wildlife Refuge since 1993. Previous Refuge Notebook columns can be viewed on the Web at <http://www.fws.gov/refuge/kenai/>.

Don't be fooled by pleasant autumn days in August on the Kenai

by Doug Newbould

August on the Kenai Peninsula is bittersweet—like strong coffee with a hint of chocolate, a mixed bag of goodies with a few sour apples thrown in, languid on the surface but with dangerous undercurrents. There are warm sunny days and cool rainy days, muggy-buggy evenings and foggy mornings. The fireweed is going to seed and will soon turn crimson. The pinks and cohos are beginning where the sockeyes and chinooks left off. And all the while, the specter of winter is lurking in the lengthening shadows—grinning. Sorry for using the “W”—word, but bear with me—I’m trying to make a point.

Growing up in southern Illinois, somewhere between the Cubs and the Cardinals, I remember August as weeks of oppressive heat and humidity or as the “dog days of summer”. I’m not sure where the phrase originated but I vaguely remember its use in conjunction with baseball on many a hot summer night. Perhaps it was uttered by one of the two great baseball voices I grew up listening to: Harry “IT COULD BE. IT MIGHT BE... IT IS—A HOME RUN!” Carey or Jack “I can’t believe what I just saw!” Buck.

I mention the Cubbies and the Redbirds because they’re what I remember about August as a kid: sitting with my Grandpa on the front porch, listening to the ball game on the radio, an oscillating fan providing fleeting moments of relief while the cicadas droned on-and-on out in the yard. Besides baseball, there was not much else going on in that part of the world—unless you liked watching corn and soybeans grow. August had a way of making you feel like an old dog lying on its side in the dirt with its tongue lolling out, unable to find the energy to raise its head. That’s the image I get from the “dog days of summer”.

August tells a different story in Alaska. It reminds us that summer is ephemeral so far north. It reminds us that complacency can kill. I was reminded of that fact last weekend when two people I know (let’s call them Fred and Ginger to protect their identities) were exposed (no pun intended) to the harsher side of August. Fred, a mountain runner, decided to take his annual run around Crescent Lake (from Crescent Creek

to Carter Lake). His friend, Ginger, an aspiring mountain runner whose plantar fasciitis (foot injury) prevented her from running with Fred, decided to mountain bike the trail instead.

When the two trail trekkers departed Soldotna, the skies were partly cloudy and the temperature was pleasant. They packed light, taking just water and light exercise clothes for a trail run that should be completed in less than three hours—all things considered.

At the trailhead, Fred and Ginger decided that Fred would run to the Carter Lake Trailhead about 16 miles away. Fred was of the opinion he would finish before Ginger due to the roughness of certain sections of the trail, and he was skeptical a bike could be ridden all the way. So the plan was for Ginger to ride up to Crescent Lake and assess the trail conditions. If the trail was too rough or overgrown, she would spend a little time seeing the sights, then return to the Crescent Creek Trailhead. If the trail was passable, she would continue on to the Carter Lake Trailhead. At the end of his run, Fred would catch a ride back to Crescent Creek, get the truck and reunite with Ginger. Then, they could go have a bite to eat at one of Cooper Landing’s local eateries.

The plan seemed reasonable, so off they went. Fred eventually left Ginger behind on the climb up to Crescent Lake and when he arrived at the lake, he found the trail so overgrown he could not see his feet. He thought to himself there was no way Ginger would attempt to ride around the lake, and even walking the bike around would be painful (eight miles of bush-whacking through devil’s club and pushki). So he finished his difficult run and thumbed a ride back to Sunrise and the trailhead.

When he arrived, Ginger was not there. “She should be here soon,” he thought. After waiting for an hour or so, he decided to drive to the Carter Lake Trailhead to see if she had completed the “difficult passage”. She wasn’t there. So he drove back to the other trailhead again, but—no Ginger. Now Fred was worried, “What could have happened to her? Is she injured? Did she run into a bear?” That’s when Fred decided to

get some help.

Fred called me about 9:00 p.m., knowing my familiarity with the area and how we could get help if necessary. He quickly explained the situation, and I suggested he make one more trip to the Carter Lake Trailhead then meet me at the Crescent Creek trail. I grabbed my backpack with raingear, first aid supplies, a fleece jacket, GPS receiver, flashlight and water and headed out the door.

On my way up the Sterling Highway I noted the dark clouds over the Kenai Mountains, and I thought, “I hope Ginger has raingear or at least something to keep her warm.” Coming into Cooper Landing, my cell phone beeped at me and I saw I had missed two calls from home: the first told me Fred didn’t find Ginger at Carter Lake so he was waiting for me at Sunrise; and the second said Ginger was safely off the trail at the Carter lake trailhead and waiting for Fred.

Of course, Fred and I were quite relieved to hear the good news, and Fred quickly returned to pick up a very tired, hungry, scratched-up and moderately-hypothermic Ginger. Afterward, we all got together and talked about what happened and about the things that should have been done differently.

As it turned out, Ginger made it up to Crescent Lake alright, but discovered the seat bolt had fallen out. Without a replacement bolt or tools she could not repair the seat, so she started walking the bike around Crescent Lake. At some point along the lake she passed the “point of no return” and decided to continue to trail’s end. The rain showers made her wet,

but bush-whacking through head-high wet vegetation kept her wet for hours. Ginger said she knew she was getting hypothermic but there was nothing to do but keep moving down the trail. She did see one bear on the trail, but it was moving away from her.

When she finally made it off the trail about 11:00p.m., and discovered Fred was not around, she knew she needed to get some help. She stripped off as much of her wet clothing as she could modestly get away with. Then, she flagged down a passing motorist who graciously gave her a fleece shirt and let her use his phone (a big thanks to the good Samaritan!).

The lessons we can learn from Fred’s and Ginger’s adventure are: always be prepared for cool, wet weather, don’t travel alone, plan for contingencies (what if—and what’s the worst that could happen), make a trip plan and follow it, and always carry sufficient survival gear in the backcountry. Also, be sure to drink plenty of water even in cool, wet weather. Dehydration contributes to hypothermia, poor decision-making and/or disorientation. And most importantly, “You’re not in Kansas anymore, Dorothy!” August means the end of summer in Alaska, so instead of expecting the dog days of summer—you’d better be prepared for a three-dog night.

Doug Newbould has been the Fire Management Officer and Safety Officer at the Kenai National Wildlife Refuge since 1999. Previous Refuge Notebook columns can be viewed on the Web at <http://www.fws.gov/refuge/kenai/>.

Windy Point burn provides food for through, and for moose, hares

by Ed Berg

It has been five years since I visited the 1994 Windy Point Burn south of Tustumena Lake, and the vegetation has grown up dramatically. Doghair-thick stands of birch saplings five to eight feet high hide fallen burn poles and uprooted throw mounds of tipped-over snags. It can take an hour and a well-scratched hide to travel 1,000 meters in this thicket. It would be a good candidate for an article in *Alaska Magazine* about Alaska's 10 worst hikes.

From the point of view of hungry moose in the winter, however, the burn is about as close to heaven as most moose get. These birch saplings are prime eating size and there is a virtually infinite supply of them. We saw abundant piles of winter moose pellets, so we know the moose are putting the area to good use.

This burn will be good hare habitat when the hare cycle rises again in the next few years. We saw only two or three hare pellets in three days of tramping through the burn. We have been in the low part of the 10- to 14-year Kenai cycle since about 2000. At the high point of the cycle I would expect to see dozens of pellets per square meter in a place like this.

The Windy Point fire in 1994 was an extremely severe, mineral soil-exposing fire, 2,800 acres in size. It started from a campfire Aug. 30 at the end of a long dry summer and kept burning until fall rains extinguished it. Much of the forest was mature upland black spruce with a foot-thick peat moss carpet. The "residence time" of the fire at a given spot was probably many days, providing complete consumption of the organic layer. It was as if someone had simply picked up the vegetative carpet and taken it out of the room, leaving the mineral soil floor completely exposed.

When we surveyed the burn in 1995 we found a muddy "moonscape" with soil that had been thoroughly sterilized. Nevertheless, we saw thousands of baby birch seedlings sprouting in the soil. Birch trees drop their seeds in the winter and the seeds are blown far and wide across the crusty snow. We found seeds especially profuse in swales where they had been concentrated by spring melt waters.

I remember seeing only a few spruce seedlings in

1995 and wondering if the burn area would ever host a spruce forest again. Now, 10 years later, we saw numerous spruce both white and black growing up in the understory, as textbook examples of "shade tolerance."

According to ecological theory, these spruce seedlings should ultimately overtop the birch trees and shade them out to produce a continuous old growth spruce forest. On the Kenai, however, spruce bark beetles and fire tend to derail ecological theory. Our white spruce forests see some degree of bark beetle thinning every 50 years on average and the black spruce forests typically burn on a rotation of about 90 years, so our forests never reach the kind of genuine old growth stage that one sees in Southeast or the Pacific Northwest.

In 1997 we installed four permanent survey plots in the burn, which we revisited in 1999 and 2004. The plots are 20 by 50 meters, and we measure densities of woody seedlings, herbaceous plants, mosses and lichens, as well as estimating tons per acre of dead and down woody fuels and duff and litter thickness. This year it took my technicians, Doug Fisher and Matt Bowser, and myself five hours of crawling over and under fallen logs to survey each plot.

For these surveys we always camp on the beach at Windy Point on the south side of Tustumena Lake and use a Zodiac to motor down the lake to a spot where we can take the shortest route from the lake to a plot. This usually involves trying to pull the Zodiac up on a gravel beach not much bigger than the boat itself in a dense shoreline alder thicket. We have learned from experience to take the motor off the boat and park it well above the water level. When we come back to the beach six to eight hours later, the wind may have come up and waves can be crashing on the beach, swamping the boat.

In 1995 we returned late in the day to the beach and found Tustumena Lake had gone berserk with down-glacier winds and four to six foot waves, in what we later found out was a typhoon. Fortunately we had Mustang suits and a tarp, so we built a fire, ate a few candy bars and hunkered down for a rather long night.

By morning the wind and rain had slacked off, so we bailed out the boat and headed back to camp.

We have seen some dramatic changes in seedling density since we started counting seedlings in 1997. Like most plants, birch trees produce a lot of seeds. Only a few of these seeds germinate as seedlings and each year these seedlings try to crowd each other out. On one plot we counted 1,628 tiny birch seedlings in 1 square meter in 1997. On the same square meter this count had fallen to 890 in 1999 and to 304 in 2004. Still, 304 seedlings per square meter works out to 1.2 million stems per acre. Most of these stems were less than six inches tall, which shows that seedlings still are being recruited. Nevertheless, in a mature birch forest we might expect only several hundred stems per acre, so we know that most of these seedlings will never make it to adulthood.

On our two less prolific plots we had counts of 5,000 and 8,000 birch stems per acre and many of the saplings were six feet high or more quality growth rather than quantity, and still very difficult to walk through. These plots showed similar values for black spruce seedlings, which still are much shorter than the birch.

The most aggressive colonist of the post-fire bare soil was fire moss (ceratodon). This is a short green moss with copper wire-like stalks that often is seen in sidewalk cracks and on roof shingles. A year after the fire, ceratodon covered 90 to 100% of the bare ground. Three years after the fire, ceratodon was being overtopped by juniper haircap moss (*polytrichum juniperinum*), which today forms a continuous brown ground cover over much of the burn. As the birch grows up, however, the trees shed leaves and the developing leaf litter layer is starting to shade out the juniper haircap moss.

We saw very little grass in the Windy Point Burn. People often have remarked about how fast our native bluejoint grass (*calamagrostis*) seems to take over after a forest has been beetle-killed or logged. In truth, this rapid takeover is an illusion. The *calamagrostis* was already there but mostly underground as buried stems (rhizomes). When the forest canopy is thinned or removed, sunlight hits the ground and the *calamagrostis* rhizomes shift into high gear for grass production.

If, however, you start with hundreds of acres of

sterilized seedbed, the grass seed must be transported by wind and germinated on the bare soil. The underground network of rhizomes must then be rebuilt, which can take many decades.

Extreme mineral soil-exposing fires like the 1994 Windy Point fire are somewhat rare on the relatively wet Kenai Peninsula. The forest rarely dries out enough to allow full consumption of the organic layer. The 1969 Kenai-Swanson River Fire was such a fire, occurring during a second summer of drought, separated by a low-snow winter. Again, the 1969 burn produced phenomenal amounts of birch and has been the prime wildlife area on the refuge in recent decades. The 1969 burn is the favorite habitat of moose, hares and everything that eats moose and hares.

The 1987 prescribed burn in the Skilak Loop Recreation Area was, inadvertently, another extreme mineral soil-exposing fire. In this area the trees were mechanically crushed in 1984, and allowed to dry for three years. After the fire was ignited, a low-pressure system moved in and the wind died down. The fire smoldered for weeks, smoking out Anchorage and consuming the entire organic layer, just like Windy Point. Today much of the area is covered with doghair-thick birch saplings. The moose and hares love this area, as does everything that eats moose and hares.

When I first visited the Skilak Loop burn in 1994, seven years after the fire, the area still looked like a moonscape, with acres of sterile soil and only a sprinkling of fireweed. I thought this was an extreme example of “over achievement” with prescribed fire and that it was something I should seek to avoid in my new job as the refuge ecologist.

As the years pass, however, and I watch these burn areas grow, I have come to view the most severe burns as the best burns for wildlife. As the climate warms, we will no doubt have more and longer dry periods and more opportunities for mineral soil-exposing fires. We humans will lament these dry periods as threats to our homes and fortunes, but the fires will be a great boon to the moose and hares and everything that eats moose and hares.

Ed Berg has been the ecologist at the Kenai National Wildlife Refuge since 1993. Previous Refuge Notebook columns can be viewed on the Web at <http://www.fws.gov/refuge/kenai/>.

You say “puncheon,” I say “planking”

by Dave Kenagy

This is a special year for our Student Conservation Association (SCA) trail crews at the Kenai Refuge. We always have a summer SCA crew working on trails, but this year we have three crews. The SCA crews focus on building new trails and upgrading popular hiking trails along the Refuge road system, whereas our back-country crews focus on maintenance and tree clearing of remote wilderness trails, such as those of the Tustumena Lake area. The Youth Conservation Corps does some trail work on the Refuge, as well, such as building last year’s Centennial Trail.

Keeping three SCA crews supplied with tools and materials all week long is more than a full-time job, so this year I have an assistant, Morgan Skidmore. Morgan jumped right in, tackled the knotty problem of logistical support and is still able to smile.

Our crew leaders are from Montana, New Hampshire, Alaska, California, and Kansas. Their crew members represent even more states and are all high school students.

It’s great to have folks from all over the country who have expertise in trail-building techniques, but it sometimes creates difficulties in communication.

What we call boardwalk in Alaska, someone from New Hampshire would call bog bridge, and someone from Montana would call puncheon. In other parts of the country it might be known as a topped log bridge or a split log bridge.

But, things get even more complicated. Boardwalk is not exactly the same as bog bridge—they are not constructed the same way. So, even though boardwalk and bog bridge are similar, we have to agree on how the structure will actually be built.

You can imagine the conversations we have in the field. “Well, I think the best thing for this swampy area would be boardwalk.” “Oh, do you mean bog bridge?” “What’s that?” “I think she means puncheon.” “Puncheon, do you mean corduroy?” “I don’t want corduroy, but I think boardwalk would work OK.”

To solve our communication problems we have resorted to arm-waving, and drawing pictures in the dirt with a stick.

Despite differences in definitions we ultimately nailed down a work plan, which the crews have pur-

sued in earnest. To take a look at their handiwork, go for a hike on any of the following trails: Hidden Creek Trail, Vista Trail, Drake-Skookum Lakes Trail, Nest Lake Trail, or Silver Lake Trail.

Let me explain a bit about how we route and build trails on the Kenai Refuge.

First, a word about the tools we use. Most of the work we do is still done with hand tools because high school volunteers are not allowed to use power tools.

You might think that our trail crews do most of their work with axes, rakes, and shovels, but mostly they use specialized trail-building tools, a couple of which came from the fire-fighting community.

The most versatile tool we use is the Pulaski, invented by a man named Ed Pulaski, who was a Forest Service District Ranger in Idaho in the early 1900’s. Ed saw the need for a single fire-fighter’s tool that could be used both to chop wood and to grub roots and soil.

Clever fellow that he was, he simply had a blacksmith twist one blade of a double-bitted axe 90 degrees to make a grubbing hoe, and the Pulaski was born.

Another tool which has a tradition in firefighting is the McLeod. This tool has a beefy hoe on one side and a beefy rake on the other. It’s great for clearing duff and contouring slopes.

Another important tool is the rock bar, which is a steel bar, half round, half square, about 4 feet in length. The square half has a beveled end which comes to a point. It works great for moving rocks, roots or stumps. The only downside is weight—16 to 18 pounds of hard, hammered steel.

There are other tools, of course, such as Sandviks, picks, mattocks, Peavys, drawknives, loppers, adzes, broadaxes, hammers, weedwhackers, sledgehammers, and more.

Well, now that you know something about the tools we use, let’s move on to trail design. We have a few rules of thumb which help us develop trails that are well planned and require little maintenance.

1. First and foremost this is a wildlife refuge, and our highest priority is to assure that trail users do not disturb wildlife, especially during nesting, calving, or denning season. We try, however, route trails so that you can see animals without disturbing them, and

also see spectacular views of mountains, lakes, and rivers.

2. It's important to identify who will use the trail and to build for their needs, interests, and hiking abilities; by doing so we end up with a variety of trails that accommodate a wide range of trail users.

3. Routing trails on south-facing slopes is best. This helps the snow melt earlier in the spring, and helps the trail dry off faster after rain showers.

4. Routing trails on top of hills or ridges, or along the top edges of slopes is also best. This helps the trail drain quickly after a rain, or during spring breakup. Trails routed along ridges or edges seldom need surface maintenance.

5. Grassy meadows look like inviting places to build trails. However, we avoid building trails in most meadows. With few exceptions, meadows are moist during dry periods and wet, muddy, or swampy after rains.

6. Trails should use a minimum of wooden structures. However, we often can't find a route that traverses a ridge, stays on the crown of a hill, or the edge of a slope, so we have no choice but to go through a wet meadow, a swampy marsh, down a steep hill with drainage problems, or across a small creek. That's when the timber-building skills of the trail crews are put to the test.

What do we build with timber? We build puncheon, planking, boardwalk, bog-bridge, corduroy, turnpike, water bars, check dams, check steps, box steps, retaining walls, and bridges. We even build a few timber structures for which there is no formal name.

However, most of our timber building is limited to boardwalk, water bars, check dams, steps and bridges.

I could explain how each of these structures is built, but I'd rather just draw you a picture in the dirt. On second thought, how about a test? Here's how it goes. The names of most of the structures describe them well enough. Take this list with you on Silver Lake Trail, Drake-Skookum Lakes Trail, Hidden Creek Trail, Nest Lake Trail, and Vista Trail and see how many you can identify.

While you're hiking, enjoy the planking/boardwalk/bog bridge/puncheon/topped log bridge/split log bridge or whatever it was that High School SCA crews installed on these trails.

Happy Hiking!

Dave Kenagy is a Park Ranger/Volunteer Coordinator at the Kenai National Wildlife Refuge, who will soon be working on the Refuge Headquarters ski trails so you can enjoy better cross-country skiing this winter. If you have questions about trails, call him at 260-6163. Previous Refuge Notebook columns can be viewed on the Web at <http://www.fws.gov/refuge/kenai/>.

Plant and animal life flourishes in wetlands this spring and summer

by Ted Bailey

Plant and animal life in the wetlands and elsewhere in our neighborhood flourished this spring and summer, especially compared to last year. If you remember, during the 2002-2003 winter we had little snowfall and high winds that drove temperatures down to an estimated -40°F during March 2003. Those cold temperatures combined with the lack of deep snow that normally provides protective insulation for plants and small animals killed the exposed stems of many evergreen plants, such as Labrador tea and bog rosemary in wind-exposed wetlands, and browned lowbush cranberry and club mosses in forested areas.

In contrast, this last winter brought us above-average snowfall, which arrived early in the winter. It not only provided adequate insulation all winter by deeply burying low-lying plants, it also provided abundant water during spring breakup. And we were fortunate to have an unusual rain lasting nearly three days in late May. All of these factors combined to provide ideal growing conditions for plants and for the animals feeding on them this spring and summer.

More than any other recent spring I can remember many plants in wetlands areas prospered. Early, in May before most annual plants had developed green leaves, numerous white, bell-shaped flowers of the leatherleaf shrubs gave many wetland areas the appearance of a very late scattered snowfall. On the heels of the blooming leatherleaf came a multitude of tiny pink flowers of the bog rosemary. Wetlands areas in our neighborhood were literally pink as thousands of blossoms burst forth in late May and early June. The white blossoms of Labrador tea and cottongrass and the tiny pink flowers of bog cranberries soon followed these in sequence. And in forested areas, unlike last summer, numerous pink blossoms indicate we will be able to harvest lowbush cranberries again this year.

The abundance of standing water was also a haven for mosquitoes, a negative aspect—from perhaps only our human viewpoint—of an exceptionally wet spring. As temperatures rose and remained high during the mostly cloud-free days of June and July, mosquitoes seemed to reach record levels. However by late July

continual high summer temperatures and lack of rainfall dried many of the smaller open bodies of water and disrupted the mosquito life cycle.

The abundance of mosquitoes may have also contributed to an abundance of one of their predators, the dragonfly. Dragonflies seemed particularly plentiful this year. I encountered them everywhere from sea level to the alpine areas. The combination of multitudes of mosquitoes, midges and dragonflies also apparently combined to make it a good year for raising swallows. At times the air over several nearby lakes seemed to be filled with tree and violet-green swallows plucking insects out of the air.

A pair of tree swallows fledged at least three, perhaps even four, young from a nest box near our home. Fledging this many young was another sign that life was prospering and that food for swallows was abundant. I lost count of the number of dragonflies the adults brought back to feed their young and could not begin to see the numerous smaller insects they returned with. The young fledged the second week of July and suddenly it seemed that within days all of the swallows in our neighbor had vanished, not to be seen again.

Within 24 hours of the tree swallows fledging, at least two fledging red-breasted nuthatches left the protection of their snug tree cavity in a decayed birch tree in our back yard. I had earlier wondered whether the nuthatches would return to use the same nesting cavity they spent so much time and effort excavating in the spring of 2003. They did. And to add to the list of flourishing wildlife, I regularly saw snipe, greater yellowlegs and a least sandpiper displaying in neighboring wetlands. Finally, three adult cow moose frequenting the same wetlands had calves; two had singles and the other had twins.

Since about mid-July I have seen large mixed flocks of birds passing through the area, mixed in the sense that a single flock of birds may contain many different species of both resident and migratory birds. Some of these flocks must have numbered well over a hundred individuals. The birds in these mixed flocks are ex-

tremely difficult to count because they are constantly feeding on the move, flitting from the ground-to-bushes, bush-to-bush, and treetop-to-treetop. Members of the same species also do a lot of pursuing each other twisting and darting among the limbs and leaves of trees. Such flocks may be visible for only 5-20 minutes and then they are gone and the forest is silent again.

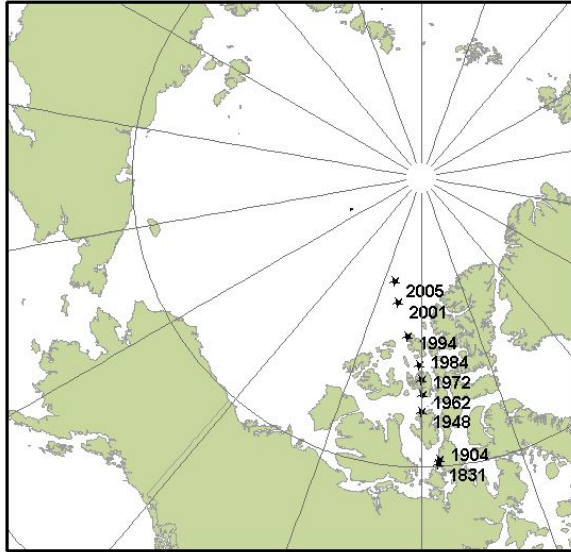
In one mixed flock that I recently observed along the Centennial Trail near refuge headquarters I tallied at least twelve species moving together through the trees. There were numerous dark-eyed juncos, ruby-crowned kinglets, yellow-rumped warblers, boreal and black-capped chickadees accompanied by at least one pine siskin, Swainson's thrush, hermit thrush, varied

thrush, hairy woodpecker, brown creeper, and a red-breasted nuthatch. These mixed flocks are a pleasure to observe. Seldom does one get to see so many species in one place in such a short period of time. I have never before seen - but perhaps only never had the time to notice - such large mixed flocks of birds. Perhaps they too are a sign that life has flourished elsewhere during the spring and summer of 2004.

Ted Bailey is a retired Kenai National Wildlife Refuge wildlife biologist who has lived on the Kenai Peninsula for over 28 years. He is an adjunct instructor at the Kenai Peninsula College and maintains a keen interest in the Kenai Peninsula. Previous Refuge Notebook columns can be viewed on the Web at <http://www.fws.gov/refuge/kenai/>.

Magnetic wander—North to the Canadian Arctic

by Mark Laker



GPS & Magnetic North Pole

It's that time of year again, when many folks dig out those old topographic maps, compass, and possibly that new GPS unit (which they scored last Christmas) and head for the woods. For some, these are tools to figure out where they are and where they are going. For others, like myself, these are tools which help me find my truck at the end of the day. As with any technology or tool, a little bit of knowledge can be a dangerous thing. After many years of providing navigational support and basic orienteering training to field crews, I've observed many creative ways of getting lost. I would like to share a few lessons that I've learned (some the hard way) over the years.

It's easy to become over-confident in technologies such as GPS—the Global Positioning System based on navigational satellites. I usually get a few calls every year from lost crews and the occasional hunter/hiker. The request is typically for the coordinates of their vehicle or camp (as best as they can describe the location). Though I consider these individuals rather courageous in publicly advertising that they are lost, I rarely get the full story on how they lost themselves. My guess is that in the rush to get out in the woods, they took just the GPS and failed to record the coordi-

nates of their vehicle or camp. All new GPS units are capable of quickly storing your current position as a "waypoint," or allowing the user to manually enter the coordinates. These are basic and essential skills that anyone relying on a GPS should master. If you don't have time to read those directions, take them along. Additionally, it is prudent to record the coordinates of important locations or waypoints on paper to take with you. Stored waypoints can be accidentally erased or lost if your batteries die, so plan on this happening to you.

It is easy to be impressed by the utility of GPS devices, especially if you previously spent years depending on a compass and map to get around in the woods. This summer we used a helicopter to visit approximately 150 remote sites. Precise coordinates were loaded onto both the helicopter and field crew GPS units. After the project was underway I asked the pilot how helpful the GPS was over the traditional practice of pointing to a spot on the map. The pilot estimated the GPS saved at least five minutes per site. That would equal at least \$10,000 saved over the summer. For field crews, being able to navigate to within five feet of a metal stake in the weeds on a 2-million acre wildlife refuge is—"priceless."

Early this summer one of the field crews came to me with an interesting problem. While navigating to survey stakes they noticed each time they stopped, a new bearing correction was needed. Each course correction was to the right, resulting in a clockwise or "right-bending" arc to their destination, which sometimes added many extra meters through mountainside thickets on their route from the helicopter landing spot to the survey stake.

When navigating to a waypoint, I always instruct people to set their handheld compass to the bearing given by the GPS. A bearing is the compass direction (in degrees) you must follow to reach the target point. Using a compass provides many benefits. First, if you are walking in a relatively dense forest, the GPS may not receive a good signal and will be of little use. Tree cover does not affect a compass because trees don't shield the Earth's magnetic field.

Second, most GPS units assist in navigation by dis-

playing an arrow pointing to the destination relative to the direction you are traveling. That means you must keep moving (sometimes rather quickly) to know which way to go. Finally, I don't believe in depending on anything that requires batteries, so I want our crews to be able to navigate with a compass and map.

My first guess as to why the crew might be bending to the right was sloppy compass navigation. A good compass will have a mirror with a sight line and notch at the top. After the dial has been set to the correct bearing, the compass is held at arm's length and the mirror is used to view the compass face and sight line. Ideally you will be able to sight a landmark a good distance away as a target toward which to walk. Often it is not possible to see a distant target in a forest, so people try to rely more on their sense of direction.

Most people tend to veer one way or another. Myself, I tend to veer to the left. You have probably heard stories of lost people walking in circles. It takes about a half an hour up to two hours for a lost person to walk in a complete circle. These thoughts led me to question if the crew was relying on their personal sense of direction over the compass. If they were naturally veering to the left, this would explain their need to continually make corrections to the right. However, after careful questioning it appeared they were using the compass properly.

My next guess was the compass they were using had not been adjusted for magnetic declination. A compass needle points to the North Magnetic Pole, not the True North Pole. True north is the North Pole. The vertical lines on a map (lines of longitude) end up at the North Pole. The North Magnetic Pole is approximately 1300 miles south of the North Pole in the Canadian Arctic. Simply stated, the vertical angle between True North and Magnetic North is the "magnetic declination."

Most USGS topographic maps provide the magnetic declination for the center of the map; depending on your location, the declination will be different. To further complicate matters, the magnetic pole is moving northwest at a rate of 25 miles per year. In Soldotna, the current magnetic declination is 20° 19' East, decreasing by 0° 13' westward per year. What this means is, if you have not set the declination on your compass, you must subtract approximately 20° from 360° (=340°) to find True North.

GPS and Magnetic North Pole

A very handy declination calculator can be found on the web at: [http://www.ngdc.noaa.gov/](http://www.ngdc.noaa.gov/geomag-web/)

[geomag-web/](http://www.ngdc.noaa.gov/geomag-web/). You provide the calculator with coordinates or a zip code, and it shows the present declination.

As a general rule I set the declination on my compass so that North (0°) is pointing to True North. In addition, adjusting for magnetic declination allows you to estimate your desired bearing using USGS topographic maps. If you walk 20 degrees off course for one mile, you will be about 1/3 mile off course. So it pays to be sure that your compass has the magnetic declination properly set for the area in which you are working.

Did this solve the "right-bending" mystery for our field crew? Unfortunately not; failure to set the compass declination would have resulted in the need to continually correct the bearing to the left, not the right.

My next hunch was to check the settings in their GPS unit. Remember what I said earlier about a little bit of knowledge being a dangerous thing. In the Setup menu of the GPS the user can customize settings such as location format (Decimal Degrees, Degrees Minutes Seconds, etc.), and North Reference (True North or Magnetic North). I soon found that the North Reference on their GPS unit was set to Magnetic North with a declination of 21 degrees East. This setting had been chosen because the users recalled needing to set their compass for declination and assumed it would be a good thing to set the GPS too. This would have been OK if their compass declination had not been set. The result was a combined magnetic correction of -42 degrees. Each bearing they took from the GPS was 21 degrees to the left of their target destination. Each time they stopped to check their bearing with the GPS, it would direct them to go right, since they had "mistakenly" gone 21 degrees (left) off course.

Though this was an unusual mistake, with the complexity of modern GPS devices, it is not difficult to make such a mistake. Remember, don't rely solely on a GPS; get a good compass. All compasses do essentially the same thing, but more expensive models offer more features that make them easier to use. One convenient feature is a liquid-filled capsule that slows the needle down. A compass with a rectangular base is easier to use with a map than a round compass. Compasses with features such as rotating dials, built in declination settings, and direction of travel arrows are easier to use.

It is good to practice navigating with just your compass and map. There are plenty of Internet re-

sources to help in basic orientation. GPS devices are great tools to increase your proficiency, but remember, a compass doesn't need batteries.

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The Harry Johnson cabin restoration project

by Bryan Taylor

Waking to the sight of hundreds of mosquito proboscises jutting hungrily through the mesh netting of your tent is enough to make anyone greatly appreciate a good shelter. The many cabins and cabin remains spread throughout the wilderness of the Kenai Peninsula have been places of refuge for old timers and visitors alike, providing protection from the elements and solace for the soul.

The 2004 Kenai National Wildlife Refuge Cabin Crew (Gary Titus, Iven Sjodin, Joshua Hightower, Bryan Taylor and Temperance Taylor) is working to maintain the life of many of the historic cabins that have been places of refuge for the early Peninsula pioneers. The history of these pioneers is dear to people throughout the Peninsula, and some of the best testimonies of the pioneers' lives are the actual material remains of the places where they worked and lived.

Nestled in the boreal forest among spruce and towering cottonwoods is one such cabin built by trapper, prospector, and wildlife photographer Harry Johnson. Mr. Johnson was a well-spoken gentleman and, despite his solitary lifestyle in the hills, he managed to maintain quite the social life with friends and acquaintances from Seward, Moose Pass, Hope, Cooper Landing, and Anchorage.

Harry Johnson had two cabins in the hills west of what is now the northern section of the Resurrection Trail. His main cabin is located on Afanasa Creek, but he also had trap-lines running in the area. The Cabin Crew has restored one of these trap-line cabins northwest of Afanasa Creek built by Johnson in 1926. It is a picturesque cabin of dovetail construction with split-chinking both inside and out. The cabin itself is a great testimony to Johnson's lifestyle. Many people knew Johnson as a very neat and tidy person. Everywhere about the cabin there are various hooks, shelves, cabinets, hitches, and cleats all made from limbs and saplings. For Harry Johnson, everything had its proper place.

When the Cabin Crew first arrived at the cabin, it

was very much in need of repair. The cabin had sunk from the rotting which had permeated the lower logs, three rounds high in places. The floor, which was just boards resting on the ground, was completely rotted out. And, the roof was decayed in most places, and completely gone in others. The slowly disintegrating cabin certainly needed some life built back into it.

A few sling-loads of supplies and several days later, the Cabin Crew restored Harry's cabin to its original state as a shelter from Alaska's harsh seasons, hazardous mammals, and voracious insect population. All in all, the crew replaced 10 two-sided rounds and the flooring, saved the roof by placing sheet metal on it, put in a new stove, and set the whole structure on pier blocks to prevent future rotting of the sill logs.

Part of our job is to preserve the history of the cabin in addition to restoring it to its original state. We recovered many interesting artifacts from the site, which give clues to Harry's daily life or perhaps how something, which is now destroyed, was originally intended. One of the more interesting finds at Harry's cabin was a 1926 newspaper under his old bedding.

Through the efforts of the Kenai National Wildlife Refuge, the historic cabin of a well-liked historic figure has been documented and restored so that future residents of the Peninsula can get a glimpse into how some of the early western settlers made a life for themselves in a sometimes unforgiving frontier. For now, Mr. Johnson's cabin remains a historic site not open for general public use. Perhaps someday this cabin will once again provide a much-needed shelter to those rugged enough to brave the hills that Harry Johnson called home.

Bryan Taylor has seasonally worked at the Kenai Refuge since 2001, first as a fee collection ranger and most recently as a member of the Cabin Crew led by Refuge Historian Gary Titus. Previous Refuge Notebook columns can be viewed on the Web at <http://www.fws.gov/refuge/kenai/>.

The Glacier Creek Fire is still generating a lot of questions

by Doug Newbould

Although the smoke has finally cleared out and structures along the north shore of Tustumena Lake are no longer threatened, I am still getting lots of questions and comments about the Glacier Creek Fire. So, I thought it would be good for me to update you on the fire's status and answer some of those questions.

During the past two weeks, a series of wetting rains, cooler temperatures and nightly humidity recovery have combined—to greatly reduce fire behavior along the perimeter and remove the heat engine from the interior of the Glacier Creek Fire. And although the fire is not yet “out”, the dragon is sleeping and should soon succumb to winter's sword.

With clear air over the fire, Refuge pilot Rick Ernst has been able to see the true extent of the fire perimeter and collect enough GPS data to allow for more accurate mapping. Our resident biometrician and GIS specialist—Mark Laker, has recalculated the size of the fire at just under 6000 acres. While much of the perimeter is cold, there remain a few “hotspots”—one in Indian Creek canyon, another along the northernmost finger and a third along the lakeshore, just east of Moose Creek. At these points on the perimeter, the fire continues to smolder and creep in deep duff, occasionally climbing up and torching dead spruce.

The Bear Creek and Moose Creek trails have been re-opened, but the Emma Lake Trail remains closed until Refuge crews can assess the damage, remove hazard trees and complete trail rehabilitation work. There is a very real possibility the Emma Lake Trail will remain closed until next summer.

No structures—private or public—were lost to the fire, thanks to the valiant efforts of Refuge and State firefighters, landowners and three fire crews: Nikolai, Kaltag and the Prineville Hotshots.

The cause of the fire remains under investigation. Evidence gathered to date indicates the fire was probably human-caused, but the person or persons responsible have not been located. And contrary to some of the rumors making the rounds, the Glacier Creek Fire was not a prescribed fire nor was it intentionally set by Kenai National Wildlife Refuge or Alaska Department of Fish & Game employees.

One of the most frequently-asked questions is,

“Why wasn't the fire put out when it was first discovered and relatively small?” The answer is somewhat complicated, but I will do my best. When I was first notified there was a fire at the east end of Tustumena Lake (8/14), I was busy fighting the Willow Ave Fire #597 in a Kasilof subdivision off the Crooked Creek Road. All available wildland firefighting resources in the vicinity, including aircraft and engines from the Alaska Division of Forestry, the Kenai National Wildlife Refuge and Central Emergency Services responded because of the fire's threat to life and property.

Our unified interagency attack on the Willow Ave Fire was not a seat-of-the-pants effort, but a pre-planned cooperative response as prescribed by the Alaska Interagency Wildland Fire Management Plan (AIWFMP). The same can be said of our response to the Glacier Creek Fire and every other wildfire that occurred in Alaska during this record fire season. The current version of the AIWFMP was established in 1998, but its usefulness and effectiveness has been tested every year. Perhaps after the 2004 fire season, we can say this unique interagency fire management plan is tried and true.

I wrote an article describing the AIWFMP in some detail, back in April of this year. You can read that Refuge Notebook column if you go to our website (see: below). Or if you would like to see the plan in its entirety, go to the Alaska Fire Service website: <http://fire.ak.blm.gov> and click on “Fire Planning.” The important thing to note is the AIWFMP gives all Alaska wildland fire managers a decision matrix tool that allows us to prioritize wildfires by their potential threats to life, property and other values at risk.

The plan classifies every burnable acre in Alaska according to its values at risk, the options for management of a wildfire on a given parcel of land and the operational considerations and procedures required for each management option. The Willow Ave Fire occurred in an area classified under the Critical management option due to the values at risk: life and private property. Critical fires receive the highest priority for suppression actions in Alaska. Conversely, the Glacier Creek Fire started in a Limited fire management option

area, classified as such because of its remote wilderness values. Limited fires generally receive the lowest priority for suppression actions.

However, every wildland fire in Alaska is analyzed individually, regardless of the land classification—to determine the values at risk, the land management objectives for the area, the fire’s potential to threaten values based on current and predicted fire behavior and weather, the availability of firefighting resources, the threat to safety of firefighters and the costs/benefits of managing the fire and different alternatives.

When the Glacier Creek Fire was first discovered, I consulted with the Refuge Managers and with the fire management officer from our cooperating fire suppression agency (the Alaska Division of Forestry). Together, we developed a plan to manage the fire, using a tool called a Wildland Fire Situation Analysis (WFSA). This written plan, signed by the land manager and the suppression agency, is reviewed daily and revised as necessary to address an ever-changing fire situation.

The Glacier Creek WFSA was revised twice during its duration. Ultimately, the decision was to allow the fire to burn within the Wilderness, while protecting private and public cabins in the area.

These kinds of decisions are never easy. The easy decision is to suppress every wildfire. It is much more difficult to let the dragon loose on the landscape. Because there is always some risk with wildfire, as much as we analyze each situation and plan for contingencies, there is always some risk that things will go wrong. But, because we do allow many fires to play their natural role in the ecosystem in Alaska, we are far better off than many states in the Lower 48. There are over 6 million acres of Alaska that won’t likely burn again for at least 50 years because of the way we managed wildfires this year.

Doug Newbould has been the Fire Management Officer at the Kenai National Wildlife Refuge since 1999. Previous Refuge Notebook columns can be viewed on the Web at <http://www.fws.gov/refuge/kenai/>.

It was a very busy summer

by Bill Kent

Please excuse me, but I'm still catching my breath from all the activity that took place on Kenai National Wildlife Refuge this summer. It was an amazing summer.

Our cabin and trail crews spent the summer working to improve trail access and rehabilitate cabins throughout the Refuge, and performed more meaningful work than I ever expected to see in one Alaska summer. The same can be said for the Youth Conservation Corps, which consists of local high school students performing needed maintenance work at a variety of locations. These paid crews were supplemented by three volunteer high school crews from the Student Conservation Association, who worked on trails in the Skilak Loop and along Swanson River and Swan Lake Roads. Add to this, the Refuge maintenance folks have been working on a new Environmental Education building at Refuge Headquarters.

Refuge cabin crews completed construction of three new public use cabins. Each of the 16' x 18' log cabins includes bunks, a picnic table, wood stove, and outhouse. The new cabins, located on McLain, Snag, and Upper Ohmer Lakes, respectively, will be available on a first-come-first-serve basis for the rest of this year, but starting in 2005 they will be available only via a reservation and fee.

In addition to the new cabins, we renovated eleven older public use or historical cabins, including replacement of roofs, sill and wall logs, windows, bunks, stoves, and outhouses as needed. Many of these older cabins will also be available for public use via a reservation in 2005. Gary Titus and his crew performed excellent work on these cabins; I hope you take the opportunity to stay in one of them in the future.

Scott Slavik, backcountry ranger for the Refuge, reports significant accomplishments in trail upgrades and improvements on many of the Refuge's 200 miles of hiking, canoe, and horse trails. All road-accessible trails and canoe system portages were cleared of beetle-kill deadfall, and improvements were also made on remote routes near Cottonwood Creek, Surprise Creek, and Lake Emma. The Doc Pollard, Hanson, and Funny River horse trails were cleared for the first four miles of each trail. Re-routes that were necessary be-

cause of flooding, erosion, or recent fires have been completed on Skyline, Bear Mountain, Kenai River, and Cottonwood Creek Trails. Scott will be evaluating the impact of the Glacier Creek fire on the Emma Lake/Indian Creek trail and will determine what is needed to re-open this trail next spring.

New timber bridges have been placed on several routes, including the popular Seven Lakes Trail, and an improved route from Jim's Landing to the Visitor Contact Station has also been completed.

Much of the cabin, trail and campground work was accomplished with a special one-time appropriation from Congress, in recognition of the fact that the refuge has an estimated 2.5 million visitors each year.

Three Student Conservation Association High School work crews supplemented Scott's backcountry trail crew. These young people, all volunteers from across the U.S., worked on trails along the Skilak Loop, Swanson River, and Swan Lake Roads.

The Youth Conservation Corp (YCC) crew, consisting of seven local high school students ages 15 to 17, finished their summer work at Refuge on August 6. Beginning in June, YCCers completed a wide range of Refuge projects including painting, brush clearing, trail maintenance, camp site clean up, and habitat protection. They worked on the Keen Eye Trail, Visitor Contact Station, Outdoor Education Center, Engineer Lake Campground, Ski Hill Road, the Swanson River Canoe System, Russian River access area, Hidden Creek Trail, and Moose Research Center. They also participated in a variety of safety and skills training. This program carries out valuable public lands management work while exposing local youth to conservation career opportunities.

The Russian River Ferry, operated as a concession contract for the Refuge, finished the 2004 season on September 7, pulling the ferryboat out of the Kenai River until next year. The non-motorized "current driven" ferry transported 32,314 people across the Kenai River to fish the confluence area of the Kenai and Russian Rivers during 2004, up from 27,481 passengers in 2003. The Ferry contractor, Alaska Recreation Management, Inc., also handled the parking for 11,333 vehicles and the launching of 1,693 boats. Ap-

proximately two-thirds of the visitors to the Russian River area were Alaska residents, with the remainder from all over the world. We consider the contractor to be an excellent ambassador for Alaska and the Kenai Refuge, and appreciate their good work.

Our Visitor Contact Station at the east end of the Skilak Loop road answered questions for more than 12,000 visitors: another 20,000 people came through the Refuge Visitor Center on Ski Hill Road. There were also almost 1,000 participants in interpretive programs at campgrounds and the Refuge Headquarters.

If you have driven on Swanson River and/or Swan Lake Roads, you have seen a major facility rehabilitation project underway this summer. D&L Construction of Soldotna is the contractor for this project, which will provide additional parking at nine trailheads, upgrade the camping areas at Rainbow Lake Swanson River Landing, and Fish Lake. New vault toilets have been installed at Fish Lake, Merganser Lake, and at both entrances to the Swan Lake Canoe Trails. There is also a new Visitor Orientation kiosk on Swanson River Road just as you enter the Refuge, near the

Sunken Island Road intersection. A new scenic overlook at mile 11 of Swan Lake Road has been constructed, and provides a great view of the lowlands north of the road.

The 2004 field season also accounted for a record number of volunteers and hours of contributed volunteer work. Our files show that 121 people, from teenagers to young-at-hearts in their 70s, contributed 20,047 hours of labor at the Refuge. This compares to 119 volunteers working 17,037 hours in 2003 and 67 volunteers putting in 9,669 hours in 2002. The 2004 volunteers worked on biological studies, environmental education, trail work, and served as campground hosts.

As I said at the beginning, it was a very busy summer for the Visitor Services Division on Kenai Refuge. I hope you take the opportunity to get out on the Refuge and enjoy the fruits of all this summer work.

Bill is the Kenai Refuge Supervisory Park Ranger and lives in Sterling. Previous Refuge Notebook columns can be viewed on the Web at <http://www.fws.gov/refuge/kenai/>.

What's going on at the refuge these days?

by Kimo Rogala



Brown bear on the Kenai Refuge. USFWS. An automatic camera captured this brown bear checking out a scent station on the Kenai Refuge. If the bear crawls through the barbwire, some hair may be scraped off that can be used for DNA fingerprinting, just as in criminal investigations. Scent stations use lures such as fermented blood that attract but do not actually reward the animals with food.

“Do you think we got any good pictures of bears?” I said excitedly to my fellow biologist. We were chit-chatting as we stood in line at Fred Meyer on our way back to the office from a day in the field. I had just dropped off several rolls of film to be developed and was waiting to pay the previous batch of pictures.

“What’s going on at the refuge these days?” asked a man in back of us, breaking into our conversation. I thought to myself, “There are so many things to talk about. Where do I begin?” I took me a couple of seconds to come up with an answer, and then I figured that I would start with the pictures.

“Well, these pictures are from our mammal hair snagging stations,” I replied. “We set up temporary scented stations to attract large carnivores. The animals smell the scents and approach the area to investigate. They soon leave, finding only some smells and nothing to eat, but if we’re lucky some hair gets scraped off on the barbwire surrounding the scented area. We can then do various tests on the hair samples

such as DNA fingerprinting to identify the species or even the individual critter, just like a crime lab. We can also store the samples for future analysis of heavy metal or pesticide accumulation in animals. The pictures in my hand are from passive infrared cameras that we set up to catch visual images in addition to the hair samples.” My long-winded answer was probably more than he wanted to know. Luckily for him it was our turn at the checkout line.

The Kenai NWR belongs to all of us and if asked, I always enjoy telling people what we are doing at the refuge. I especially like situations that look a bit weird to the casual observer, because they often prompt interesting questions. For example, if you were driving along the Sterling Highway at the beginning of summer you might have seen some odd sights. At one long straight stretch you could have seen four people walking along the highway with full-body mosquito netting, hip waders, and large nets. Were they dip netting for the elusive Kenai land salmon? No. What you saw was tadpole sampling at some ponds along the highway. This sampling was part of a comprehensive study on deformed frogs. It is a follow-up on an earlier study, which suggested that the rate of frog deformity is higher than normal on the refuge. The current study is also asking why we might have more deformities than normal.

You could have also seen along that same stretch of Sterling Highway a lone person sitting in a camp chair on the grass looking at the road. I’m sure that many passersby thought, “Why is a person lounging on the side of the open highway in the middle of the day, doing nothing?” Although there are many sleek-looking cars and trucks on the peninsula, vehicle viewing is not some kind of new recreational fad. What you saw as you sped past was a noise disturbance study. There was one person sitting at the highway with a noise meter and counting vehicles, while two other people with noise meters were moving away from the road. The goal was to see how noise drops off as you move away from the road. Unlike many other wildlife refuges, the Kenai Refuge combines wilderness with high human habitation. We are trying to see how vehicle noise levels might affect wildlife in an otherwise pristine set-

ting, and the first step is to actually measure the noise.

Then there was the couple visiting from Nebraska. They were driving along Skilak Lake Road, when out of the alder bushes popped three refuge biologists. The couple stopped and said, "You're the first wildlife we've seen around here!" They had been driving along the road hoping to get lucky and see a moose or bear. Instead they found us coming out of an isolated stretch of forest, with no obvious means of transportation. We had been dropped off to conduct a snowshoe hare survey at one of several long-term plots. Data have been recorded since 1983 at different post-fire successional forest habitat sites around the refuge. We had been counting snowshoe hare pellets in the permanent plots to monitor the hare population. Since lynx go up and down with the hare populations, counting these hare pellets gives us an indirect measure of how the lynx are doing, as well as a fairly direct measure of hare abundance.

Hikers often walk up the Russian River trail and see fishermen loaded with all their gear. If, however you see someone who looks like a fisherman, but sporting an antenna rather than a pole, it might be a refuge biologist. Fishing is not the object here, but rather radio telemetry. Radio telemetry is fairly well known by many people for large animals. Most com-

ments I received such as, "Can I watch the football game too?" were made in jest. However, most people think telemetry is used only on large mammals such as bears or wolves. Indeed, several wolves on the refuge do have collars on them and we regularly use radio telemetry to keep track of their whereabouts. What you may not know is that we use telemetry for many other projects. For example, earlier in the summer we used telemetry to locate nesting areas of harlequin ducks. Although they are often seen on the Kenai and Russian Rivers, little is known about harlequin ducks so we are using small radio collars to find out where they nest.

These are just a few of the biology projects occurring on the Kenai NWR. Additionally, there are many other projects occurring with law enforcement, visitor services, volunteers, education, trails & cabins, and fire management. So next time you see a Kenai NWR employee engaged in a curious activity, feel free to ask "What's going on at the refuge these days?"

Kimo Rogala is a seasonal biological intern at the Kenai National Wildlife Refuge. He recently graduated from San Diego State University with a bachelor's degree in zoology. Previous Refuge Notebook columns can be viewed on the Web at <http://www.fws.gov/refuge/kenai/>.

Attraction to the natural world often begins in early childhood

by Theodore N. Bailey

I have always wondered when my colleagues in the fields of wildlife biology and conservation and natural science in general first become attracted to the natural world. Most careers dedicated to conservation are certainly not launched for financial reasons because our careers are not among the most monetarily lucrative compared to many others. Neither is it for power or prestige, as these are attributes seldom associated with careers dedicated to conservation or to the natural sciences.

Because of my inquisitiveness, I often asked colleagues how they first became interested in the natural world. Most recalled early childhood experiences outdoors with family members. One, who acknowledged that his father was then too busy earning a livelihood to spend much time with him, traced his attraction to the outdoors to the time he spent, often fishing, with his grandfather. Another colleague from a large city in the Midwest fondly remembered annual family camping trips “out West” to Yellowstone National Park and other scenic western and wild places. Still another recalled her love of the outdoors began while horseback riding as a child through nearby fields and forests.

Although unaware of it at the time, these early childhood experiences later played an important role in their decisions to embark on a career that led them outdoors devoting their lives to conserve, protect, and preserve creatures of nature or wild and pristine places. It is not by mere chance that such important impressions are formed in early childhood. The reason authors Gary Nabhan and Stephen Trimble wrote *The Geography of Childhood: Why Children Need Wild Places* was because “we are concerned about how few children now grow up incorporating plants, animals, and places in their sense of home.”

Their argument is, “As children, we need time to wander, to be outside, to nibble on icicles and watch ants, to build with dirt and sticks in a hollow of the earth, to lie back and contemplate clouds and chickadees.” Their studies indicated that contact with even common wild creatures has become rare for most American children. One reason is the places where

most people live. Today, only about 21 percent of Americans live in rural areas and only 1 percent live on farms. Today, surveys indicate most children’s exposure to nature comes from the media—primarily television—instead of hands-on experiences with their parents or elders. Exposing children to nature also has to occur at an early age before peer and social pressures and hormones take over. Usually those early childhood experiences in nature last throughout life.

In an essay in the August 16, 2004 issue of *Newsweek* magazine entitled *Save the Elephants: Don’t Buy Ivory Soap*, Katie Johnson Slivovsky argued that burdening kids with issues they can’t understand creates confusion, not future earth caretakers. She said what influenced her most in choosing a career was not hearing alarming news about the environment but was “the fun she had playing in the woods as a kid.” She concluded that the best way to make children future caretakers of the natural world was to instill in them a love of nature and earth-friendly conservation practices such as recycling.

And in an excerpt of the book *Curious Minds: How a Child Becomes a Scientist* that appeared in the September 2004 issue of *Natural History* magazine, one of the world’s most esteemed biologists and author, Lynn Margulis, recalled that her interest in science and the natural world began early from about the age of five. To avoid her parent’s squabbles after they moved to Chicago, she would lie in a small patch of grass sandwiched between the traffic-ridden South Shore Drive and a cracked concrete sidewalk in front of their house and study ants and sow bugs hidden under rocks. Later, as a scientist, she advanced the now widely accepted view that the tiny organelles (mitochondria and plastids) within in all living complex cells, including the trillions of cells composing our own bodies and those of other life forms, were once free-living bacteria that at some point became incorporated into our cells.

My attraction to the natural world also began at an early age. I was fortunate to have been born and raised in a rural landscape surrounded by forests, abandoned

fields, pastures, marshes, streams, oxbows and a small creek. As a child I carefully explored each landscape and came to know many of its creatures. Catching frogs, tadpoles, turtles, cicadas and butterflies and picking blackberries first with a guardian—my older “tomboy” sister—and then alone consumed my summers. In the fall, my mother gathered hickory nuts and walnuts with us; my father showed me mushrooms that were edible and which to avoid.

My earliest memories are of fishing with my father along the nearby creek. Only a five-minute walk from our home we fished with bamboo “poles” and a can of worms, had the entire creek bank to ourselves, and sometimes returned with bullheads or a rock bass for supper. In the spring we were surrounded by flowers—bluebells, trilliums, trout lilies and spring beauties—and in the fall by falling red and yellow leaves of oak and hickory trees and the scolding of squirrels. But what I vividly recall was not catching fish but the serenity, time spent with my father, the singing of birds, and watching wild creatures secretively making their way along the creek bank beside us. Those early experiences taught me to be observant, quiet, and patient.

My wife Mary, also from a rural area, and I took our young children on hikes, camping and fishing, experiences they still recall as adults. Young children do not need to experience grand vistas or landscapes with moose, bears, and wolves to appreciate the natural world. A friend of mine once told me he was

disappointed while spending time outdoors with his young daughters because they had not seen a moose or other large creature. He was disappointed until he noticed that instead they were focused on plants and small creatures he had failed to notice himself. Children identify best with small creatures that often escape the notice of adults.

Regarding educating children, author Gary Nabhan observed, “a good teacher or nature guide can nurture such incipient naturalists, but they can seldom create them from scratch.” So, to all parents, grandparents, aunts and uncles who enjoy and value our natural world and want the next generation to care for our planet, take young children, grandchildren, nieces and nephews outdoors often, take them exploring, hiking, camping, hunting and fishing. The nearby Kenai National Wildlife Refuge offers many opportunities for these activities. And let children safely explore the vacant lot next door or across the street for ants and flowers and make secret “hiding places” among bushes and trees. You may be instilling in them an appreciation for the natural world that may eventually influence their future and the future of our planet.

Ted Bailey is a retired Kenai National Wildlife Refuge wildlife biologist who has lived on the Kenai Peninsula for over 28 years. He is an adjunct instructor at the Kenai Peninsula College and maintains a keen interest in the Kenai Peninsula’s wildlife and natural history. Previous Refuge Notebook columns can be viewed on the Web at <http://www.fws.gov/refuge/kenai/>.

How I rescued a marbled murrelet

by Noah Nelson (with help from Chloe Nelson and Cindy Sherlock)

My name is Noah. I am eight years old and am home schooled in Kasilof. On August 25th, our family had just sat down for lunch when I heard my dog, Kasi, barking and growling. I jumped up and ran outside to see what the matter was. She was chasing after a baby bird. I caught Kasi and put her in our garage. By that time, my mom had come out to see what was going on. She had me get a box to put the baby bird in.

We weren't sure what kind of bird we had but thought it might be a loon or murre. It was black and white and had a pointy beak and webbed feet. We live near the Kasilof River, but we didn't think we were close enough to have a water bird in our yard. Whenever I tried reaching in the box to pet it, it would open its beak and lunge at my finger so I thought it was mean. I tried giving it some bread but it wasn't interested.

My mom made a few phone calls to find out where we could take our bird. I've rescued a lot of birds that have hit our windows, but this one was special and we didn't know how to care for it. She found out the Kenai National Wildlife Refuge in Soldotna would care for our bird. We met Liz Jozwiak at the Refuge and she said they would find out what kind of bird we had and would care for it.

Liz later told us the bird we found was a Marbled Murrelet, one of only three that she has treated in 15 years of doing bird rehabilitation at the Refuge. The other two Marbled Murrelets were discovered in 1991, one was found in Clam Gulch on August 9th (later released in Homer) and the other was found at Ward's Cove in Kenai on August 19th (it did not survive). All three of these murrelets were juvenile birds. Kathy Kuletz at the Migratory Bird Management office in Anchorage told us that our photos showed the egg tooth, as well as other juvenile plumage characteristics. Egg teeth are a growth at the tip of the bill that baby birds use to break out of their shell. Kathy thought that our murrelet had fledged from the nest within the past week because the egg tooth disappears from older juveniles.

Liz sent our murrelet to Cindy Sherlock, an experienced and licensed bird rehabilitator. Cindy knew what to do immediately. Even before an injured or

starving bird receives any food, it needs to be rehydrated with fluids. Cindy used a tube to give our murrelet fluids directly into its stomach. This is known as the gavage technique, and can be very stressful to small birds especially if not done properly.

Once the murrelet was well on its way to getting rehydrated, Cindy then needed to provide it with nutrition. So what do murrelets normally eat in the wild? Cindy contacted veterinarian Pam Tuomi at the Sea Life Center in Seward, and she was able to provide not only the necessary information, but also sent us some tiny fish to feed it. The murrelet really went for those fish!

Since murrelets spend the majority of their lives in the water when they are not nesting, Cindy provided our murrelet with a large tub of water. The murrelet's keel, or breastbone, needed to be cushioned from the hard ground when it was not in the water. So Cindy rigged up netting material to suspend the murrelet when it was not swimming in the pool.

Dr. Tuomi discovered a bump or nodule on the elbow joint of the murrelet's right wing that prevented it from flying. It may have collided with something and injured its wing on its journey from the nest to the Cook Inlet. Dr. Tuomi determined that our murrelet would not survive if it was released back into the wild like we had hoped. Cindy has already found it a new home at the Seattle Aquarium.

We looked up information on the internet to learn as much as we could about these birds and here are some facts we discovered. Marbled Murrelets are a marbled brown color in the summer and black and white in the winter. They have short, compact bodies and strong wings that allow them to "fly" underwater catching anchovies, herring and other small fish.

Marbled Murrelets can be found along coastal waters from Alaska to California and Russia to Japan. They are listed as a threatened species in Oregon, Washington, and California, but they are abundant in Alaska. Only 160 nests have ever been found! They are small seabirds that nest inland in coniferous trees or on cliffs. They lay one egg per year which is incubated for about 28 days. Once the eggs hatch, the parents feed the chick a small fish two or three times

per day (not bread.) The parents fly out at dawn and return at dusk so they are rarely seen.

This has been a fun experience and I've learned a lot. And if you ever find a bird that is injured or too young to care for itself, the Refuge is the place to take it.

Noah and Chloe Nelson are home-schooled children in Kasilof who enjoy learning about wildlife. Cindy Sherlock is a licensed wildlife rehabilitator who volunteers her expertise at the Refuge. Previous Refuge Notebook columns can be viewed on the Web at <http://www.fws.gov/refuge/kenai/>.

Where's the wildlife?

by John Morton

I'm sure there are times when you must wonder where the wildlife is on the Kenai Refuge. This kind of thought might hit you as you're hunting for caribou, paddling through the canoe system, birding along the Skyline trail, or simply driving down the Sterling Highway looking for moose to show visiting relatives.

Professional wildlife biologists spend a lot of time trying to answer exactly this kind of question. Typically, we either census a population or sample a population. A census is a count of all the individuals in a given area. On the Refuge, we conduct annual aerial surveys to locate and count all bald eagle and trumpeter swan nests. These nests are relatively easy to spot from the air, and both species have high "site tenacity," meaning that they nest in the same general area year after year.

We can census large animals that move around in groups by cheating a little. Working with Alaska Department of Fish and Game biologists, we put radio transmitters on a few animals within a caribou herd or a wolf pack. Having these "Judas" individuals to betray the location of a herd or pack allows us to get a complete count from a Cessna. That's how we know that we have 1,100 caribou in four herds (or did, before a series of mortality-causing avalanches).

We also sample populations. This approach is similar to what the Gallup Organization uses to poll us about who we're going to vote for in the upcoming presidential elections. We develop a statistical sampling design that allows us to extrapolate population estimates from a much smaller sample to the 2-million acre Refuge. Again, working with our interagency partners, we fly aerial surveys to count moose along transects or wolverines within nine-square mile plots. That's how we know that there are 5,000 moose on the Refuge, give or take a few.

Over the years, these methods have been refined so that they give us reasonably accurate counts of these species and tell us something about their distribution. However, under the Alaska National Interest Lands Conservation Act of 1980, the Refuge is mandated "to conserve fish and wildlife populations and habitats in their natural diversity". But it's difficult to fulfill our mandate if we don't know what constitutes natural di-

versity on the Kenai. This is a pretty tall order given that we have something like 200 vertebrate species and over 300 vascular plant species on the Refuge! There just aren't enough biologists for that workload using conventional methods of inventorying and monitoring.

So we've had to come up with a new way. Rather than following animals as they move across the landscape, we sample a plot of land to see what moves across it. Our plots are distributed on a grid across the Refuge at 3-mile intervals. This past summer, we sampled breeding land birds (70 or so species) and vascular plants on 150 points (every other point) on the grid. Although we measured bird densities and habitat structure at each point, the primary purpose of this surveying method is to determine presence or absence of each bird species.

By doing this in a systematic manner, we are able to use a statistical technique called logistic regression to model the probability of a species occurring at a point, given some information about the habitat there (basically topography and vegetation). We then use the analytical capabilities of our Geographic Information System to apply the regression equation to digital pixels that code habitat data. The result is a map that shows the distribution of a species across 2 million acres, such as the accompanying map for Savannah Sparrows. We can now do this for several dozen bird species, and plan to extend the method to various mammals, plants and insects in future surveys.

Not only is this a pretty cool use of technology, statistics and biology, it's fairly cost effective. Through a memorandum of understanding that we've signed with the U.S. Forest Service's Forest Inventory & Analysis program, we survey the wildlife and they survey the forest vegetation.

In the near future, we expect to determine the winter distribution of snowshoe hares, wolves, and other winter mammals on the grid by using aerial digital videotaping. We also expect to sample the distribution of hundreds of aerial insect species by deploying tent traps on the grid. Ask a Refuge biologist, "Where's the wildlife?" and we might be able to give you better answer in the coming years.

John Morton is the Supervisory Fish and Wildlife Biologist at the Kenai National Wildlife Refuge and an Affiliate Professor of Biology at the University of Alaska

– Fairbanks. Previous Refuge Notebook columns can be viewed on the Web at <http://www.fws.gov/refuge/kenai/>.

“I am not a morning person”

by Doug Newbould

I’m really not sure when I discovered this fundamental truth about myself, but I am now acutely aware of this fact—I am NOT a morning person. I don’t think it happened during my adolescence. At least my mother never mentioned I was a bear in the morning, getting up and ready for the school bus. In high school, I was into varsity athletics year-round, so most mornings I had to get myself to school for early workouts. I don’t remember that routine as particularly traumatic. In fact, I think I enjoyed it. I know I had a huge advantage over everyone else during the first couple of classes, because my blood was pumping and my mind was alert.

Perhaps I discovered morning sickness at Colorado State University in Fort Collins. But, unfortunately, I don’t remember too much from those years so I hesitate to pin the blame there. Dazed and confused is a state of mind that could spawn morning dysfunction, but I’d rather not think about that now. At least then I lived in a relative state of freedom, without a daily routine and able to choose on a daily basis—whether or not to get out of bed.

Perhaps I gained an aversion to mornings during the early years of married life, when I worked nights tending bar at one of the big bowling alleys in Grand Junction, Colorado. I would go to work about 5:00 p.m. and not get home until 2:30 or 3:00 a.m. When my wife got up and went to work in the morning, it was my job to wake up and tend to the children. That was when sleep deprivation really became routine for me. Looking back, I wonder how my kids survived the early years with Mr. Mom.

Once I got off the swing-shift and started working days again for the U.S. Forest Service, I really enjoyed

my job - so getting up early in the morning was not too much of a chore. However, that phase of my life introduced me to wildland fire-fighting, to 16-hour days, to the occasional all-nighter and to strong coffee. Still, I don’t remember disliking mornings all that much.

Could it be Alaskan mornings I have developed such an aversion to? They never seem to start at the same time on any two consecutive days. Summer mornings seem to start before I get to bed some days. And winter mornings seem to get stuck in sunrise mode. But how could it be? I love the alpenglow of winter mornings and watching the sun rise from my office window. And I love the summer mornings, when you can get up to go fishing at 4:00 a.m. and the sun has already beaten you to the punch.

Or, could it be my caffeine-addiction? A pot a day of the strongest crude I can create has got to play a role. If that’s the case, at least I know I’m not alone. There have got to be more espresso joints per capita in Soldotna, than anywhere else in the world (13 or 14 by my count).

The one cause I am in denial over—is age. As I approach the Big 5-Oh, I wonder if the cumulative impacts of the sleep-deprivation, all those all-nighters, and the triple-shot caffeine cocktails have finally done me in. I guess I just don’t know why I’m not a morning person. And I certainly don’t hate those bright, cheerful morning people. I’m usually just too groggy to care. Maybe I should just sleep on it—things always look different—in the morning.

Doug Newbould has been the Fire Management Officer at the Kenai National Wildlife Refuge since 1999. Previous Refuge Notebook columns can be viewed on the Web at <http://www.fws.gov/refuge/kenai/>.

The blue goose—mythical creature or enduring symbol?

by Scott Slavik

Do you know what bird can be seen at every one of the 500 plus National Wildlife Refuges in the United States? The answer is the Blue Goose. The Blue Goose is not some ubiquitous waterfowl with indigo plumage, but rather the official symbol of the National Wildlife Refuge System. In the six years that I have worked at the Kenai National Wildlife Refuge I've seen the Blue Goose on a daily basis. I've worn Blue Goose pins and temporary tattoos and had my picture taken with a "live" six-foot tall Blue Goose at last year's Refuge System centennial celebration in Ninilchik. But why a Blue Goose? I'd never given it much thought until now, that is. On a whim, I did some research and here's what I found out.

An editorial cartoonist named Jay Norwood "Ding" Darling (1876-1962) designed the emblem of a stylized Canada goose, blue in color on a white background, over 65 years ago. Darling was born in Norwood, Michigan and his editorial cartoons appeared in approximately 150 major daily newspapers throughout the United States. It has been estimated that in the period 1900 to 1949 he drew 15,000 cartoons chronicling the history, trends, thoughts, and politics of the United States. He signed his cartoons with the nickname "Ding," which he derived by combining the first letter of his last name Darling with the last three letters. In an era before television and the internet, where newspapers were the primary source of information, Darling's cartoons had a substantial impact on public opinion. His accomplishments as a political cartoonist won him two Pulitzer Prizes. An avid hunter and fisherman, he was passionate about politics and conservation and often worked themes involving pollution and extinction of wildlife into his cartoons.

In 1934 President Franklin D. Roosevelt appointed Ding Darling as the head of the U.S. Biological Survey, the predecessor of the Fish & Wildlife Service, and Darling soon came to be known as the leading conservationist and ecologist of his generation. He worked to increase national attention and expenditures for conservation as well as developing programs and institutions that would benefit wildlife. It was during this time that he created the flying Blue Goose symbol for federal wildlife refuges. The Blue Goose has marked

refuge boundaries, entrance signs, brochures, and exhibits ever since.

In addition to establishing the National Wildlife Federation and the Migratory Bird Conservation Commission, Ding Darling helped pass the Wildlife Restoration Act, which provides money to states for the purchase of game habitat through a tax on sporting firearms and ammunition. Darling also created the Federal Duck Stamp Program and designed the nation's first "Duck Stamp." Duck Stamps are the federal license required for hunting migratory waterfowl, and today more than 1.5 million stamps are sold each year. Proceeds from the sale of Duck Stamps are used to purchase wetlands for the protection of waterfowl habitat. It is considered by some to be the most successful conservation program ever initiated. Darling has been referred to as the best friend ducks ever had.

Ding Darling's achievements in conservation were immortalized in the dedication of the J. N. Ding Darling National Wildlife Refuge on Sanibel Island, Florida. When you visit any national wildlife refuge in the country, you still see Ding Darling's legacy—the Blue Goose. The Blue Goose may not be a rare bird, but it has indeed become a respected one. It continues to symbolize the National Wildlife Refuge System, the only network of public lands dedicated specifically to wildlife conservation. Rachel Carson, author of "Silent Spring" wrote, "whenever you meet this sign, respect it. It means that the land behind the sign has been dedicated by the American people to preserving, for themselves and their children, as much of our native wildlife as can be retained along with modern civilization."

It was nothing more than good old fashion curiosity that started my research into the history of the Refuge System's Blue Goose logo. I wasn't sure what the outcome would be, but I ended up discovering a unique man with an interesting history who became a prominent figure in the early conservation movement in the United States. The most important thing I learned during the writing of this article is that often the simple and familiar things that surround us, upon deeper investigation, can reveal an untold story of great relevance. I think this same lesson can be

applied to the natural treasures of the Kenai National Wildlife Refuge, which we can all sometimes take for granted. Perhaps the only thing better than maintaining a sense of wonder and curiosity of the world around us is to actually stop and take the time to learn

more about it.

Scott Slavik is a Backcountry Ranger at the Kenai National Wildlife Refuge. Previous Refuge Notebook columns can be viewed on the Web at <http://www.fws.gov/refuge/kenai/>.

Kamchatka—mixture of southern Alaska's past and future

by Ed Berg

I recently took a trip across the North Pacific to visit another northern peninsula—the Kamchatka Peninsula. When we flew into the coastal capital Petropavlovsk-Kamchatski, we could see several Redoubt-sized volcanoes dominating the landscape. These volcanoes are part of an arc of volcanoes running down the spine of Kamchatka toward Japan. To the north, this volcanic arc extends to Alaska through the Aleutian chain and the Alaska Peninsula. It's all the same geology, with the Pacific tectonic plate diving under continental plates on both sides of the ocean. When the plate reaches a depth of about 100 kilometers (62 miles), it starts to melt and feeds the volcanoes overhead, which creates the same kind of spectacular scenery that Kamchatkans and Alaskans love so well.

During the Soviet period Kamchatka was closed to foreigners and indeed to most Russians because of the harbor and submarine base in Avacha Bay where Petropavlovsk is situated. In the last decade, however, Kamchatka has been opened up, and ecotourism is one of the most promising venues for economic development. The country is strikingly beautiful, but it is much less developed than Alaska. There is basically one rough road down the center of the peninsula, with offshoots to small villages. Remote travel is by helicopter and all-terrain trucks. There is no developed network of trails, and visitors need to hire a guide service for vehicles and logistical support. You don't just rent an RV and drive down the road to a nice campground in Kamchatka.

There are large parks and wildlife refuges in Kamchatka, but critics say that they exist primarily on paper because the government doesn't provide enough money or staff to enforce the rules. Poaching is rampant, and in a dirt-poor economy it is impossible to prevent at least subsistence harvest of wildlife by local residents. More ominous is the large-scale black market in brown bear gall bladders for traditional Chinese medicine. We were told that upwards of 2000 brown bears are poached every year, simply for their gall bladders, which can bring several thousand dollars on the black market.

One rather bazaar form of poaching consists of harvesting salmon for the roe. The Russians make ex-

cellent red caviar out of salmon roe, and I must admit that I ate quite a bit of it on several occasions. We saw photographs of large piles of salmon carcasses where the helicopter-borne poachers had simply stripped the roe from the salmon and discarded the meat. This illegal industry—together with salmon poached for meat—generates an estimated \$1 billion a year in Russia, and threatens to decimate what was once thought to be an inexhaustible supply of salmon. There are innumerable streams coming off the Kamchatka Peninsula and they generate approximately one fourth of the wild Pacific salmon stocks. These pristine streams are probably like the salmon streams of our Pacific Northwest at the time of Lewis and Clark.

On the positive side I am glad to see that people on both sides of the Pacific are beginning to appreciate salmon red caviar. Black Russian caviar was traditionally made from sturgeon roe from the Caspian Sea. The most caviar favored by connoisseurs comes from the Beluga sturgeon, which is now an endangered species, due to virtually unrestricted fishing since the end of Soviet control in 1990. The development of a legal red caviar industry will hopefully take the pressure off sturgeon and provide highly palatable caviar at a much lower price.

I often complain to my wife Sara about throwing away the roe as we are cleaning our salmon. I think that next year I will go into full caviar production and let her take care of the filleting. Red caviar is a treat not to be wasted!

The occasion of my visit to Kamchatka was as a member of a sister city delegation from Homer, Alaska to Yelizovo, Kamchatka. Homer has a sister city relationship with Yelizovo, and several exchanges from both sides have occurred since the mid-1990s. Yelizovo is a town of about 50,000 souls, located inland about 20 miles from the much larger port of Petropavlovsk, which is about the size of Anchorage. As an official sister city delegation, we were given the red carpet tour by the mayor's staff and members of the local Rotary chapter. We visited schools, hospitals, museums, a mineral water bottling plant, a fish hatchery, and enjoyed a couple of good soaks in local hot springs.

Everyone that we met was very friendly and help-

ful, and we made some good friendships that we would like to continue in future years. Rotary organizer Steve Yoshida and retiring Homer mayor Jack Cushing had made several previous trips to the area, so they reconnected with old friends, including some who had been to Homer and Soldotna on similar visits. Pratt Museum director Heather Beggs and Steve Yoshida interviewed high school students as candidates for Rotary-sponsored student exchanges with Homer High School for next year, so we may once again be seeing some of the younger faces from Yelizovo in our classrooms.

Although many folks spoke some degree of English, we always had an interpreter with us for the official visits. I speak Russian better than I can understand it, so conversations would often develop with me speaking my broken Russian and the other person replying in their broken English. Several years of English language are required in school, so most people have a basic English capability even if they don't try to use it. We met with a high school English class and found the students able to converse pretty well with us. (They wanted to know all about the interests of American teenagers, so we had to kind of wing that one, as most of us were beyond the age of having teenagers at home anymore.)

The collapse of the Soviet Union has not made life easy in this far outpost of the Russian world. In the old days the government was the main employer and people had a great deal of job security, even if they couldn't buy a lot of desirable goods with their money. Nowadays there are nice consumer goods on the shelves, but people don't have much money to buy them. Shopping in Yelizovo revealed prices not much cheaper than Alaska, yet a doctor or a teacher only makes \$150-200 a month. Most people live in rundown Soviet-era rectangular concrete apartment buildings and don't have the money to keep them well painted. (We will know that things have really changed in Russia when Home Depot sets up shop in Yelizovo.)

In spite of the low incomes, people are amazingly well dressed. The beautiful young women are typically dressed in skirts and heels and looked like they just stepped off the pages of the latest U.S. fashion magazine. Men generally wear slacks and often leather jackets, not the blue jeans and hiking boots so popular in Alaska. I wore a nice Harris Tweed sport coat everyday and never felt overdressed. If I wore such attire in Alaska, people would ask me if I were going to a wedding or a funeral.

The new market economy is slowly taking hold, but it seems to be a foreign idea. In the past the opportunity to start your own business simply didn't exist, so there is not yet a culture of small business operators that can educate one another. Necessity being the mother of invention, however, businesses are beginning to emerge to take over some of the services that the government simply abandoned with the collapse of the publicly-owned socialist economy. Some business people are obviously doing quite well, to judge from their well-polished late model cars.

The recent affluence, I must say, was much more noticeable in Vladivostok, where we stopped for a day in route to Kamchatka. Vladivostok is a major port; it is the gateway to Russian Far East, analogous to Seattle and the Pacific Northwest. Building is going on all over Vladivostok at a furious pace and there are many well-polished late model cars on the busy streets.

When I returned home I sat down and wrote a short proposal for a Russian language school for tourists, modeled after the popular tourist-based Spanish language schools in Central America. Yelizovo would be a great place for such a school, because travelers could combine Russian language study with activities such as mountain trekking, fishing, hunting, marine wildlife cruises, and in the winter with excellent downhill and cross-country skiing. I am hoping that some aspiring entrepreneur will pick up this ball and run with it, and that I can return as a student.

I am also eager to return to Kamchatka to see some of the wild parts, and to study the botany and geology, as well to visit some of my new friends. On a longer scale, however, I worry about how Kamchatka will be developed in the coming decades. A lot of damage was done to fragile environments in Alaska and the Lower-48 during the early years of resource extraction, as well as by military operations during the Cold War. Kamchatka was lucky to escape some of the worst environmental abuses of the Soviet era, but like Alaska it could be trashed very quickly if people are not vigilant about protecting the environment.

Russia has some good environmental regulations on the books, but the government lacks the political will to enforce them. In the U.S. we have a long tradition of strong grassroots conservation and environmental movements that pressure Congress and government agencies to protect the environment. Imperfect as it is, this is our system of checks and balances. This system was only beginning to develop in 1904, for example, when forester William Langille recom-

mended to Teddy Roosevelt that the Federal government set aside most of the Kenai Peninsula as a forest and wildlife reserve to protect fragile environmental resources. It took another 37 years of grassroots conservation activism to establish the Kenai National Moose Range in 1941, and many more years of activism to pass the Alaska National Interest Lands Conservation Act (ANILCA) which created the Kenai National Wildlife Refuge in its modern form.

Today there is a wide variety of citizen groups, ranging from the Safari Club to the Sierra Club that have strong stake in the well-being of the Kenai Refuge. This kind of grassroots infrastructure is only beginning to develop in Russia today, and especially in remote Kamchatka. It's a race to see if the environmental forces can grow fast enough to counterbalance the frontier mentality of unrestricted development and "the devil take the hindmost" characteristic of newly released capitalist energy.

Oil and gas have been found offshore on the west side of Kamchatka in the Sea of Okhotsk, in Tertiary sedimentary formations very similar to the reservoir rocks of Cook Inlet. On-shore infrastructure and a proposed 470-kilometer gas pipeline across Kamchatka (crossing 20 rivers) could seriously impact pristine salmon habitat, as well as open up a pipeline road conduit for salmon poachers. A large gold deposit was discovered within the Bystrinsky Nature Park, and subsequently the Park boundary was redrawn 50 kilometers

inside the Park to allow for mine development. Does all of this sound like Alaska 50 years ago? Or today, for that matter?

In a world of rapidly growing population and ever-shrinking spaces, there are few pristine wilderness areas left on Earth. We human beings value these places for their wild beauty and we seek them out, even if only in our minds' eye in books and video nature programs. In my opinion, the long-range value to the human race of a wild Kamchatka or the high country in the Alaska mountains is the beauty that these places can bring to the eye of the beholders. This wild beauty is a marketable asset, and if it is protected, people will be always pay good money to see it, especially in an evermore crowded world. A pulse of hydrocarbons or a few tons of precious metals are nice, but long after these commodities are gone, human beings will still be searching for wild beauty, and paying good money to experience it.

Information about travel in Kamchatka can be found at: <http://www.explorekamchatka.com/index.html>. Kamchatka's environmental issues are discussed at: <http://www.pbs.org/edens/kamchatka/bountiful.html#rahr>.

Ed Berg has been the ecologist at the Kenai National Wildlife Refuge since 1993. Previous Refuge Notebook columns can be viewed on the Web at <http://www.fws.gov/refuge/kenai/>.

Henry David Thoreau's "Walden" still relevant after 150 years

by Ted Bailey

I recently purchased a 150th anniversary edition of Henry David Thoreau's book *Walden*, an edition claimed to be "the most beautiful edition ever published of Thoreau's masterpiece," with color photographs of Walden Pond, trees, leaves and even tiny mosses interspersed throughout its 275 pages. The publisher pointed out that the price of the book (\$28.12) was only a half a cent less than what Thoreau spent to build his cabin on Walden Pond in 1845.

Thoreau lived alone in this small cabin as an experiment: "I went to the woods because I wished to live deliberately, to front only the essential facts of life, and see if I could not learn what it had to teach, and not, when I came to die, discover that I had not lived." He lived there from July 4, 1845 to September 7, 1847 and then wrote *Walden*, which describes not only his experiences but perhaps more significantly his philosophy of life. First published in 1854, *Walden* has never been out of print since 1862, the year of Thoreau's untimely death from tuberculosis at the age of 44 years.

I first read Thoreau's *Walden* over 40 years ago. I had then recently returned to the United States after serving three years overseas in the military and was struggling to find my place in civilian life in a country that seemed different from the one I had earlier left behind. I still remember finding the small, green hardback book—a 1950 edition—with most of Thoreau's writings, including *Walden*, in a bookstore. Its dustcover—a silhouette of a lone man looking out over a peaceful country landscape—caught my eye. I did not know about Thoreau's writings at the time. But after reading *Walden* I was inspired, along with my love of the outdoors and an intense curiosity about the natural world, to pursue a career dedicated to better understanding and conserving our natural world. I still have that worn book but the dustcover that first attracted me is long gone after years of handling and numerous moves about the country.

Now recognized as one of America's greatest writers, Thoreau was not so admired or recognized in his own time. Some neighbors considered him strange, an unusual person wasting a potentially "productive"

life by taking walks and observing nature while others worked hard to make a "decent" living. And to further convince them of their doubts he left his hometown, built a small cabin on a nearby Walden Pond and lived there alone two years reading, writing and carefully observing and documenting the natural world around him and his observations of humanity.

Thoreau was an exceptional observer of nature. Biographers have noted that in his later years he spent much of his time documenting the natural history of the world around him. Few of nature's creatures escaped Thoreau's attention. Since I had studied lynx, I was especially interested about his observations when a farmer shot a lynx near his hometown of Concord, Massachusetts ("An Estabrook Lynx") on September 9, 1860. Thoreau was apparently fascinated that a lynx had been killed nearby because lynx were then already rare near Concord. He wrote "I have heard of two or three such within a year, and of half a dozen within fifteen years." Dismayed at its death and by a man's question about whether he had gotten the State's ten-dollar award [for a dead lynx], he said "You might have inferred ten dollars was something rarer in his neighborhood than a lynx...." I also obtained a copy of his hand-written letter about the lynx that he wrote to the Boston Society of Natural History; it would be the only lynx Thoreau would see in his lifetime.

There are numerous thought-provoking passages in *Walden*. One of my favorites is: "Our village life would stagnate if it were not for the unexplored forests and meadows which surround it. We need the tonic of wildness—to wade sometimes in marshes where the bittern and meadow-hen lurk, and hear the booming of the snipe; to smell the whispering sedge where only some wilder and more solitary fowl builds her nest, and the mink crawls with its belly close to the ground." There are many more.

Thoreau lived during the Industrial Revolution in America. The building of factories and a railroad in his hometown and the increasing emphasis on "human productivity" were already changing the landscape, society, and the lives of people in ways he thought

were detrimental to the human spirit and to the dignity of individuals. These observations led to perhaps his most remembered quote that, “The mass of men lead lives of quiet desperation.” In part it was an observation of those who he thought were sacrificing their lives merely for material gain. Perhaps that is why some readers still find relevant Thoreau’s thoughts expressed in *Walden* and elsewhere in his writings in today’s increasingly consumption-dominated and artifi-

cial world.

Ted Bailey is a retired Kenai National Wildlife Refuge wildlife biologist who has lived on the Kenai Peninsula for over 28 years. He is an adjunct instructor at the Kenai Peninsula College and maintains a keen interest in the Kenai Peninsula’s wildlife and natural history. Previous Refuge Notebook columns can be viewed on the Web at <http://www.fws.gov/refuge/kenai/>.

The Kenai Refuge from a newcomers viewpoint

by Tai Davis

This is a great place to work. On the trip driving up from Oklahoma and to this day, I was still awe-struck over the wonders of the wilderness. The seven day cramped drive was well worth it!

Now let me start off by saying that I love being outdoors, provided the bugs stay out of my boundaries, and I don't get dirty or wet—picture that! With enough gear, I can pull it off. I remember going crabbing in South Carolina a few years ago, where I had on rubber boots, plastic gloves, long pants/shirt, a hat, and a towel to block the sun. I didn't get dirty, but I was really hot. My co-workers assured me that in a couple of years I would get acclimated, but I am glad to now be in cooler country.

When I accepted my position as an Administrative Technician (Permits) at the Kenai National Wildlife Refuge, I was only given a little information about the area and what I'd be doing. Whatever the situation might be, I was coming to Alaska with bells on. I had wanted to live up here for 13 years, and it was time to do it. In 1998 I had a job opportunity up here, but I was discouraged from coming when I heard on the news that it was 40 degrees below zero and that a man was stranded in his home with no food.

The first day on the job at the refuge, my assignment was to go up in a plane to view the refuge from the air, so I would have some knowledge of the area when asked questions. Later, I was able to go rafting, something that I'd only done at water amusement parks. In the future, I plan to get out and do more things on the refuge. I really look forward to going camping.

I was able to see the end of summer, which to me was great minus in the smoldering humid temperatures I had experienced down south in Texas, South Carolina, Oklahoma, Louisiana, and Georgia. While preparing for my move here, I conditioned my mind that I wouldn't have to be hot during the summer. Having solved the temperature issue, I now have to deal with the mosquitoes!

It was pretty cool seeing people catch all the gigantic fish. Where I come from in the South, if you were to tell someone you caught a fish that big—you'd better have a picture of it, otherwise you'd be accused

of telling a fish "tale." My two sons caught a few dolies. They swelled up with pride that they were able to bring home dinner. I was relieved they'd learned to clean them while spending summers in the country with my dad!

So far my first winter has been pretty mild. I've heard countless horror stories about winter harshness. The ice on the ground is pretty tricky, I'll say. Thank goodness for ice cleats! Some teenagers told me that I didn't need them, and that I needed to learn to do the Alaskan shuffle down, but "no thanks"—the cleats will do just fine. I look outside everyday and am so thankful to be able to experience this beauty. I was amazed to see the first snow in September, even though it didn't last long.

It's great seeing all the wildlife along the roads and so close to you. It reminds me of the Arbuckle Wilderness in Ardmore, Oklahoma, where you drive through a theme park and view animals from your vehicle. It's interesting to learn about hunting, fishing, trapping and much more. Growing up in the city, I used to think my dad shot our Christmas tree every year. Yes, he'd go hunting and would always come back with a tree, even if he wasn't lucky with his hunt. I still have lots of questions to ask anybody who will let me bug them.

Some people think the Wildlife Refuge is only law enforcement. Not true, our great team is made up of biologists, visitor services, volunteers, student conservation, administration, fisheries, maintenance, pilots, fisheries, fire management staff, and of course law enforcement. Each section working together helps our operation run smoothly.

There is so much to learn and do on the refuge. In the summer there are more programs running than during the winter months, but don't let that stop you, please come by and see us.

Winter programs include wildlife films shown on weekends on the hour from noon to 4 p.m.), Dec. 11/12 – Antarctica: Life in the Freezer (55 min.), Dec. 18/19 – A Mystery in Alaska (55 min.) Jan. 2 – Sled Dogs: An Alaskan Epic (55 min.); snowshoeing/walking trails, Winter Fun Day early February (guided snowshoeing tours/indoor activities). School field trips will start up early February. The ski trails open daily – sorry, no

dogs on the trails, please.

Visitor Center Hours: The refuge is open year round. Winter hours are weekdays 8:00 am to 4:30 pm and weekends 10 am to 5:00 pm. We will be closed for Christmas Dec 24-26 and New Years Dec 31- Jan 1. Questions? Please call us at Refuge Headquarters at

262-7021.

Tai Davis is experiencing her first winter in Alaska, working as the new permit specialist at the Kenai National. Previous Refuge Notebook columns can be viewed on the Web at <http://www.fws.gov/refuge/kenai/>.

In search of the perfect Christmas tree, or “the one that got away”

by Doug Newbould

If you are like me, you are starting to think about getting a Christmas tree. If you are a procrastinator like me you'll probably chew on the idea for a couple of weeks, or at least until your wife goads you into action. Some folks like to put up their tree right after Thanksgiving. Personally, I like to keep my holidays separate. Seeing Christmas decorations or listening to, “Santa Claus is Coming to Town,” the day after Halloween tends to make me grumpy. I'm actually starting to think Scrooge wasn't such a bad guy after all.

Of course, I'm kidding—at least about the Scrooge part. Actually, getting a tree in Alaska (at least in the parts of Alaska where trees are abundant) couldn't be much easier—or cheaper. Many of the public land managers here in south-central Alaska including the Kenai National Wildlife Refuge, the Alaska Division of Forestry and the Chugach National Forest, allow folks to go out and collect a free-use Christmas tree.

And yes, there are some rules you must follow to take advantage of this privilege. I'll tell you how you can get a tree from the Refuge, but if you want to collect a tree on state or national forest lands you need to contact those agencies directly. The rules for cutting an Xmas tree on the Refuge are: select a tree that is at least 150 feet (50-70 adult paces) from refuge roads, trails, campgrounds, facilities and waters (lakes, rivers, creeks, etc); no cutting is allowed at Refuge Headquarters or on Ski Hill Road; cut the tree as close to the ground as possible (please, no topping); and you may take only one tree per household.

Those are the only official requirements for cutting a Christmas tree on the Refuge. However, I would like to suggest a few unofficial rules or conservation alternatives. Consider this—since spruce bark beetles have wiped out most of the white spruce in South-central Alaska, it only makes sense that we try to protect any remaining white spruce seedlings and saplings. So alternatively, you could buy a nice tree from a local nursery or commercial Christmas tree lot. Or, have you ever thought about an artificial tree? I have seen

some very attractive artificial trees in recent years and you can get them in just about any size, shape or color. And with artificial trees, you don't have to worry about sap or needles on your floors. If it's the scent of fresh spruce, fir or pine you crave, you can buy pine oil or scented candles to sweeten the air in your home.

But if you really want to cut a live tree, please consider cutting a black spruce instead. Black spruce are plentiful on the Kenai Peninsula and are rarely infested by spruce bark beetles. If you are not sure how to tell the difference between white and black spruce, here's a quick dendrology lesson. Black spruce (*Picea mariana*) usually have shorter needles (1/4 to 5/8 inch versus 1/2 - 3/4 inch) than white spruce (*Picea glauca*). Black spruce also have smaller cones (5/8 to 1 1/4 inch vs. 1 1/4 to 2 1/2 inch). Black spruce twigs tend to be covered with short reddish, brown or black hairs while white spruce twigs are hairless and orange brown in color.

If you are still unsure about the species, try taking a tree from an area where live spruce saplings are plentiful or are growing closely together. Consider taking a tree that has been damaged by weather or animals. I sometimes look for trees with forked, broken or multiple tops. Another conservation idea is to take a tree from an area that is periodically cleared, such as a power line right-of-way. Perhaps one of your neighbors needs to remove some trees from his or her property to create defensible space?

Wherever you go, please be sure you are on the land where you have permission to cut a tree. And if you find that perfect Christmas tree out there somewhere, wouldn't it be great to tell your grandkids about the one that got away—while you enjoy a picnic lunch in its shade?

Doug Newbould has been the Fire Management Officer at the Kenai National Wildlife Refuge since 1999. Previous Refuge Notebook columns can be viewed on the Web at <http://www.fws.gov/refuge/kenai/>.

Diseases can be spread to wildlife populations by domestic animals

by Elizabeth Jozwiak

There is always a concern about the potential transmission of diseases from wildlife populations to both humans and domestic animals. West Nile Virus (WNV) is one example of a disease spread by wild birds and mosquitoes that has been in the media spotlight in recent years. It is only recently that wildlife managers, conservationists, and biologists have focused their attention on the reverse pattern; the spread of contagious diseases from domestic animals into wildlife populations. Many of these wildlife diseases are viewed as “emerging” particularly as we introduce species around the globe and as our domestic plants and animals encroach on natural habitat.

Domestic animals that are allowed to roam or mingle with wildlife, such as dogs and cats can harbor diseases which can be devastating to rare species. For example, in 1985, the last remnant of the black-footed ferret population in North America was reduced from an estimated 58 individuals in 1985 to 16 individuals in 1986. This catastrophic decline in numbers was attributed partly to infection by canine distemper virus (CDV) and partly to losses during juvenile dispersal. CDV typically causes disease in domestic dogs. In Tanzania, CDV has caused the death of lions and other wild carnivores, and is believed to have been transmitted to wildlife by infected domestic dogs owned by local tribesmen.

Feline infectious peritonitis (FIP) and feline panleukopenia virus (FPV) are both contagious diseases of domestic cats. FIP has been diagnosed in jaguar, mountain lion, and lynx, and FPV (also known as feline distemper) has been found in the endangered Florida panther. A portion of the deaths in the declining California sea otter populations were attributed to *Toxoplasma gondii*, a domestic cat parasite. *Toxoplasma* cysts (which can be found in cat feces) were present in the contaminated sea water where sea otters were present.

Domestic animals have generally been selectively bred and have evolved under different conditions than their wild counterparts and thus many have become more or less susceptible to certain diseases or strains

of pathogens. Because of their population isolation, this is especially true for wildlife species that are specialized for more remote habitats (i.e. bighorn sheep and mountain goats). One classic example of how domestic livestock and wildlife have evolved differently and carry different diseases is the exchange of the *Pasteurella* spp. bacteria from domestic sheep (*Ovis aries*) to bighorn sheep (*Ovis canadensis*).

The *Pasteurella* species that has been linked to severe die-offs of wild bighorn sheep in all of the western United States is transmitted to bighorns through contact with domestic sheep and yet has no negative effect on the domestic sheep. Bighorn sheep populations in the San Juan Mountains of Utah experienced a 98% herd reduction over an 18-year period due to *Pasteurella* related die-offs.

There have also been concerns over the transmission of other types of pathogens such as scabies and assorted parasites from domestic sheep, cattle and horses to bighorn sheep and mountain goats. Recent increases in the use of non-traditional livestock such as: goats, llamas, alpacas, and camels, for recreational use in remote habitats has also prompted concern from wildlife biologists and outdoor recreation enthusiasts.

The introduction of domestic livestock or captive wildlife (elk, deer) and grazing practices in natural areas has allowed diseases to spill over into wild populations. Pioneers brought cattle with them as they came west and let them loose to forage on the open range. This open range was habitat for a great diversity of wildlife species and often the two could not help but interact.

The practice of open-range grazing by livestock on lands co-occupied by wildlife is still widely practiced today. While there are many mutually beneficial results of this practice, it has also led to some major problems. The primary concerns include the displacement of wildlife off of their traditional grazing lands, and the transmission of diseases between domestic animals and associated wildlife. For instance, a disease called brucellosis that causes pregnant animals to abort was probably co-introduced to America

with cattle. So the presence of the disease in bison of Yellowstone National Park is considered a potential threat to domesticated cattle grazing at the park's boundaries.

Chronic wasting disease (CWD) was first identified in captive deer in Colorado in 1967 and since has been found in wild and/or captive deer and elk in parts of at least seven other states (Montana, Wyoming, South Dakota, Kansas, Nebraska, Oklahoma and Wisconsin) and two Canadian provinces, (Alberta and Saskatchewan). Researchers speculate that CWD could have been transported long distances as a result of interstate shipment of infected animals.

Another mode of disease transmission is the introduction of animals to new geographic regions and the co-introduction of their pathogens. For example, avian malaria on Hawaii is thought to have caused the extinction of a number of native song bird species and was originally introduced with exotic, alien birds. Newcastle virus, a disease of domestic poultry has caused widespread deaths in nestling and juvenile pelagic birds, such as in double crested cormorant colonies. An epizootic of rabies in raccoons was started when people moved raccoons from a rabies-endemic area to the mid-Atlantic region, in an attempt to increase hunting stocks.

Wildlife populations on the Kenai NWR are also at risk of developing diseases from domestic animals and introduced species. In the early 1980s the Kenai Peninsula wolf population contracted an ectoparasite (the biting dog louse) probably from contact with free ranging or feral dogs. The parasite causes itching and hair loss, and reduces an animal's ability to stay warm in

winter. The parasite spread quickly through the population, and earlier attempts by the ADFG and USFWS to eradicate the lice by treating wolf packs with medication was unsuccessful. Coyotes also became infected with the biting dog louse, but in smaller numbers.

Blood samples from wolves, coyotes, and lynx collected by Refuge biologists since 1976 have shown that both CDV and CPV occur to some degree in the wolf population on the Refuge probably as a result of contact with domestic dogs. Exposure to CDV and/or CPV was first detected in wolves in 1979, and about 12% of the sampled wolf population was exposed to both viruses. Tests have also indicated that one lynx out of 54 sampled was exposed to CDV and also tested positive to FPV.

A solution to reduce disease transmission from domestic animals to wildlife populations will involve educating the residents of communities that live along the boundaries of the Refuge. Properly vaccinating pets, and preventing dogs, cats, rabbits, poultry and livestock from ranging freely are good approaches. Never allowing the transplant, or release of non-native game birds, such as chukar, quail and ring-necked pheasants off personal property will also help eliminate the spread of exotic diseases to Kenai Peninsula's native wildlife.

Elizabeth Jozwiak is a Wildlife Biologist at the Kenai NWR. Liz spent 6 months in 2001 with the USGS National Wildlife Health Center in Madison, Wisconsin where she specialized in wildlife disease investigation. Previous Refuge Notebook columns can be viewed on the Web at <http://www.fws.gov/refuge/kenai/>.

Hunting ethics

by Kelly Modla

As a Refuge officer, I see quite a variety of hunting ethics in the field. For some, it's doing the right thing when no one is around; packing out trash, picking up litter carelessly left behind, and following the rules and regulations related to the hunt. For a small percentage, however, hunting ethics are not important; it's doing whatever you want, when you think no one is looking.

The 2004 moose hunting season on the Kenai National Wildlife Refuge was not much different from previous years that I have seen. Several legal bull moose were taken out along the Swanson River and Swan Lake Road areas. Five sub legal bulls were also taken. Three of these were self turn-ins, one a wanton waste, and one an illegal take from the field.

The three hunters who turned-in their moose each thought they had shot a legal bull. This is a mistake typical of the last week of moose hunting season. Ultimately, responsibility falls on the hunter to take the time to determine if the animal is legal. Unfortunately, these three bulls will not be available for future harvest. However, these hunters did the right thing by turning themselves in.

The 'hunter,' who shot and left a bull moose to waste along Swanson River road, robs ethical hunters of game and promotes a distasteful image of hunters to the public. This hunter failed to determine the legal status of the bull, or perhaps was just poaching and left the moose because of fear of unknown consequences such as fines, jail time, or forfeitures.

In the final case, the hunter removed the illegal bull from the field. Observation and concern by an ethical group of hunters regarding the legal status of the bull led to successful apprehension of the violator.

Each of these examples shows different ethical values. In the case of the turn-ins the hunters accepted responsibility for their mistakes and contacted authorities. As a practical matter, penalties for violations that are self-reported are often less than if a person tries to hide the violation and is later discovered by the authorities. The wanton waste case is the epitome of a game thief, whose conduct is perceived by all as unbecoming of a hunter. Still the misdeed did not go unnoticed, due to the action of another hunter who knew that this behavior was illegal, inappropriate and un-

ethical. In the final case, the hunter chose to attempt to keep the sub-legal bull, hide it and elevate the unethical behavior. The hunter did not anticipate someone else was watching, someone who possessed different ethics.

The best way to avoid shooting a sub legal bull is to watch the Alaska Department of Fish and Game video titled, "Is this moose legal?" The video gives the hunter the opportunity to see spectacular footage of legal and sub legal bulls in various field conditions. The rules are a bit complex, and it helps to see some good concrete examples of what is legal and what is not.

A subcategory of hunting ethics is the fair chase ethic. Fair chase as defined by the Boone and Crocket Club is, "the ethical, sportsmanlike, and lawful pursuit, and taking of free-ranging wild animals in a manner that does not give the hunter an improper or unfair advantage over them."

I was reminded of the fair chase ethic during a recent contact. One hunter had placed a loaded firearm in his pickup truck, muzzle down, alongside the passenger's leg. Firearm safety was not on their minds. Under State law it is legal to have a loaded firearm in an automobile. On the other hand, I have yet to find a hunter education manual condoning the practice of operating an automobile with a loaded firearm lying on the front seat. A loaded weapon takes on a distinct meaning when road hunting and it is far from the notion of fair-chase. The hunter complied with my request to unload the firearm, but stated that doing so would mean he would not get a moose this year because the gun was unloaded. The hunter may not have taken a moose because shooting from, on, or across the roadway is illegal, unethical, and not fair chase.

Driving with a loaded firearm is commonly practiced on the Kenai National Wildlife Refuge. Out of several dozen vehicle stops of road hunters this season, only two hunters did not have loaded weapons in their vehicles. (By "loaded" I mean having ammunition in the magazine or chamber.) I take my hat off to the hunters who do not drive with loaded weapons in their vehicles.

Unfortunately, there are no laws prohibiting a hunter from taking a poor shot. This is where skill

or voluntary restraint steps in. Wounding an animal is every hunter's disappointment. Well-placed shots decrease an animal's suffering, show respect for the resource, and show care for the meat. Be responsible while in the field and accept the responsibility of your actions. Unlike voting, hunting is a privilege and not a right, so let's not let ballot initiatives nibble away at our hunting privileges. Hunting attracts the attention of many different people. Make the difference.

In a quote from his book *A Sand County Almanac*, Aldo Leopold sums it up best; "A peculiar virtue in wildlife ethics is that the hunter ordinarily has no gallery to applaud or disapprove of his conduct. Whatever his acts, they are dictated by his own conscience, rather than a mob of onlookers. It is difficult to exaggerate the importance of this fact".

Respect for the resource and a desire to protect and conserve it are what motivates people to get

involved in organizations like Ducks Unlimited, the Rocky Mountain Elk Foundation, Trout Unlimited, and the list goes on.

I have had the pleasure of talking with many hunters in the field. These are often men and women who have a passion for the hunt, a feeling that nurtures their souls. On some level, I think we all desire this. Let's treat the resource with respect, promote stewardship and accept nothing less from our fellow hunters.

The staff of the Kenai National Wildlife Refuge wishes all our readers and visitors a Merry Christmas!

Kelly Modla has been a Refuge officer for the Kenai National Wildlife Refuge for the past seven years. Kelly and her husband Robert live with their son Jacob, age 18 months, in Sterling. Previous Refuge Notebook columns can be viewed on the Web at <http://www.fws.gov/refuge/kenai/>.

Soldotna area Christmas Bird Count slated for Sunday, January 2, 2005

by Elizabeth Jozwiak

Once again local birders from the Kenai/Soldotna area are invited to participate in the 105th Annual Christmas Bird Count to be held this Sunday.

The Audubon Christmas Bird Count (CBC) is an early-winter nationwide bird census, where volunteers follow specified routes through a designated 15-mile (24-km) diameter circle, counting every bird they see or hear all day. It's not just a species tally—all birds are counted all day, giving an indication of the total number of birds in the circle that day.

All individual CBCs across North America and Canada are conducted in the period between Dec. 14 to Jan. 5 each season, and each count is conducted in one calendar day in a given area. Birders from Seward, Anchorage, Homer, and other areas of Alaska also participate in this annual event.

The history of how the Christmas Bird Count began is quite interesting! The first CBC was done on Christmas Day of 1900 as an alternative activity to an event called a "side hunt" where people chose sides, then went out and shot as many birds as they could. The group that came in with the largest number of dead birds won the event.

Frank Chapman, a famed ornithologist at the American Museum of Natural History and the editor of "Bird-Lore," recognized that declining bird populations could not withstand this kind of over-hunting, and he proposed to count birds on Christmas Day rather than shoot them.

The data collected by observers on these Audubon Society Christmas Bird Counts over the past century have allowed researchers, conservation biologists, and interested individuals to study the long-term health and status of bird populations across North America.

In the 1980s, CBC data were used to document the decline of wintering populations of the American black duck, after which conservation measures were put into effect to reduce hunting pressure on this species.

The Soldotna Christmas Bird Count originated in 1983 with the center of the 15-mile diameter circle being the Kenai National Wildlife Refuge headquarters

and covering most of the Soldotna area, including a good stretch of the lower and middle Kenai River.

Although the count was discontinued in 1992, it restarted in 1999 and has been running ever since with the dedication of local birder Jack Sinclair who has been the official compiler of the data each year.

Some of the more common birds seen during the Soldotna CBC have been the bald eagle, black-billed magpie, common raven, assorted gull species, common redpoll, pine grosbeak, pine siskin and boreal and black-capped chickadee. Some uncommon species observed on the Soldotna count in previous years have included a northern shrike, northern hawk owl, and a white-crowned sparrow.

Homer birders conducted their CBC on Dec 18th, and had quite a number of unusual and rare sightings. Dave Erickson reported that participants in the area observed a pintail duck, two Wilson's warblers, and a short-tailed shearwater.

Birders, or anyone interested in participating in this year's Christmas bird count, should meet at the Kaladi Bros. Café in Soldotna between 8:30 a.m. and 9:00am so that birding groups can be assembled and observation areas assigned.

Participants do not have to be experts, but only have a desire to get outside and look for birds. The birding effort normally concludes at dusk (about 4 p.m.) or when weather precludes any measurable returns.

Inexperienced birders will be grouped with more seasoned CBC veterans to help familiarize them with where to go and what to look for.

Each participant should dress warmly, and try to bring a good set of binoculars and a bird identification book for species most often found in Alaska. You may also want to bring a camera to document any rare or unusual sightings. There is a \$5 fee per field participant which will help defray the cost of production and publication of the 105th Christmas Bird Count issue of American Birds.

No fees are charged for persons under 18 years old, or for those planning to survey their backyard

bird feeders during the Christmas Bird Count. Anyone having an active bird feeder in the count area is encouraged to help. Counting the single highest number of a species at a feeder at any one time, including any unique feathered visitors, is a big help to the count.

For anyone wanting to pre-register, or just interested in the Christmas Bird Count, there is a wealth of information available online at www.audubon.org/bird/cbc/. The Soldotna bird count totals since 1984 are available to view here as well as every other bird count in North America during the last century.

For more information, contact Liz Jozwiak at the Kenai NWR 260-2818 or Jack Sinclair at Alaska State

Parks 262-5581.

Also, if you come across a chickadee with an upward elongated curved (i.e., deformed) bill, please report it to us at the Kenai National Wildlife headquarters (262-7021). This information will contribute to an important regional study on the causes of bill deformities in southern Alaska.

Elizabeth Jozwiak is a wildlife biologist for the Kenai National Wildlife Refuge, and takes every available opportunity to go birding. Previous Refuge Notebook columns can be viewed on the Web at <http://www.fws.gov/refuge/kenai/>.